Visual Building Solar Designer User Manual

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1 INTRODUCTION

1.1 GENERAL

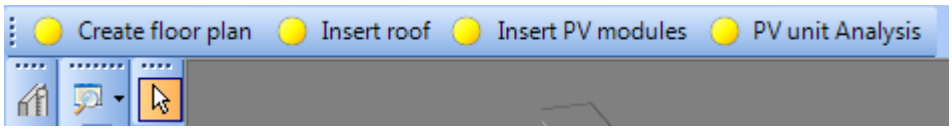
This manual describes the features of the Solar Designer module used within Visual Building.
With the Solar Design-Plug-in you are able to place PV Modules on roofs and any other areas. After completing the design you can calculate possible generated power. With this information you can then easily calculate the income generated from the feed in tariff.

The design process is as follows:

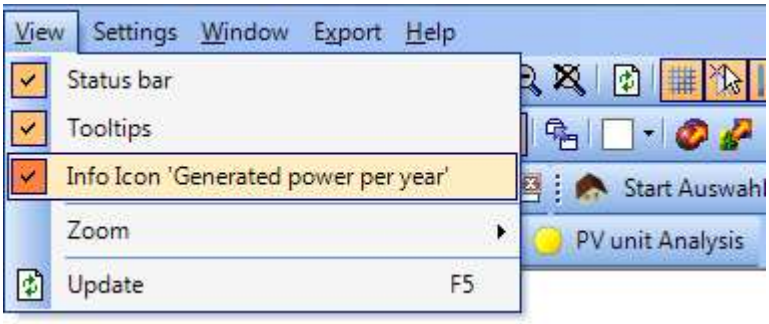
- Enter the building or the building outline
- Add dormers, roof windows and chimneys to the roof
- Define the geographical position and orientation of the building
- Define the PV Modules size and other technical specifications
- Calculation is then performed on all entered parameters
- If required, the shadow calculations can be performed

1.2 SPECIAL FEATURES OF THE SOLAR DESIGNER

The Solar Design-Plug-in introduces the following tools to the Visual Building tool bar:



You can show or hide the info panel (the sun and clouds) using the setting in the menu **View**

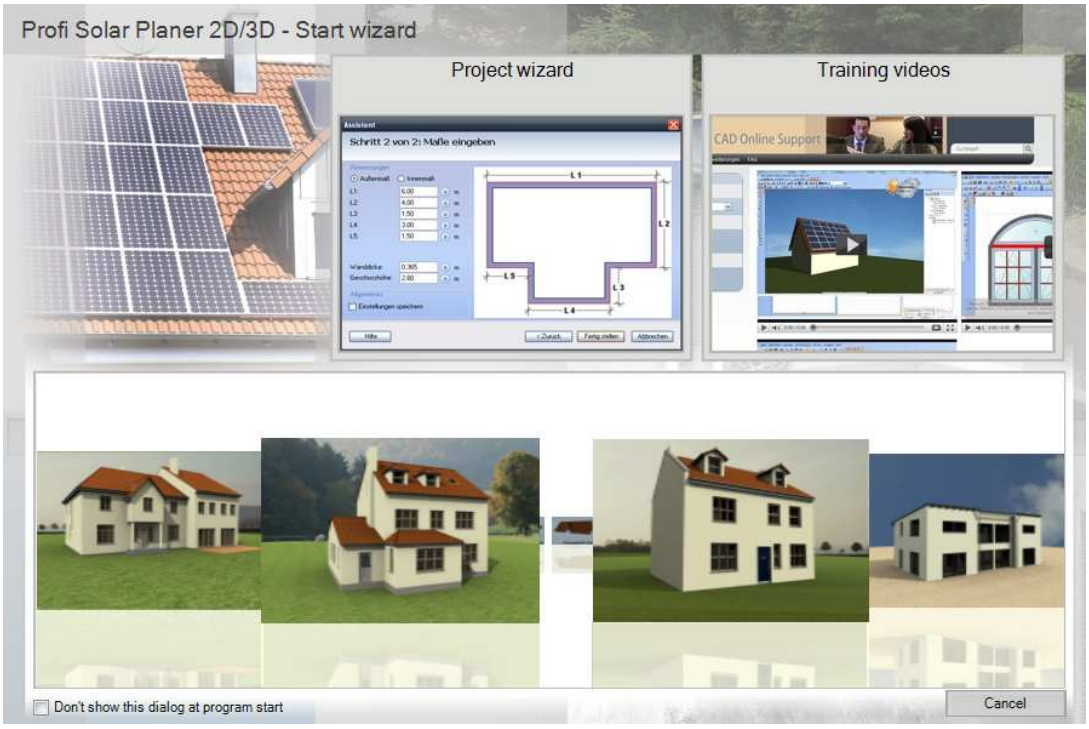


2 THE STEPS TO DESIGN A PV-SYSTEM

The creation of the building in the CAD system is both simple and powerful. In this section we will only show the most important functions. Additional features can be found in the CAD software documentation.

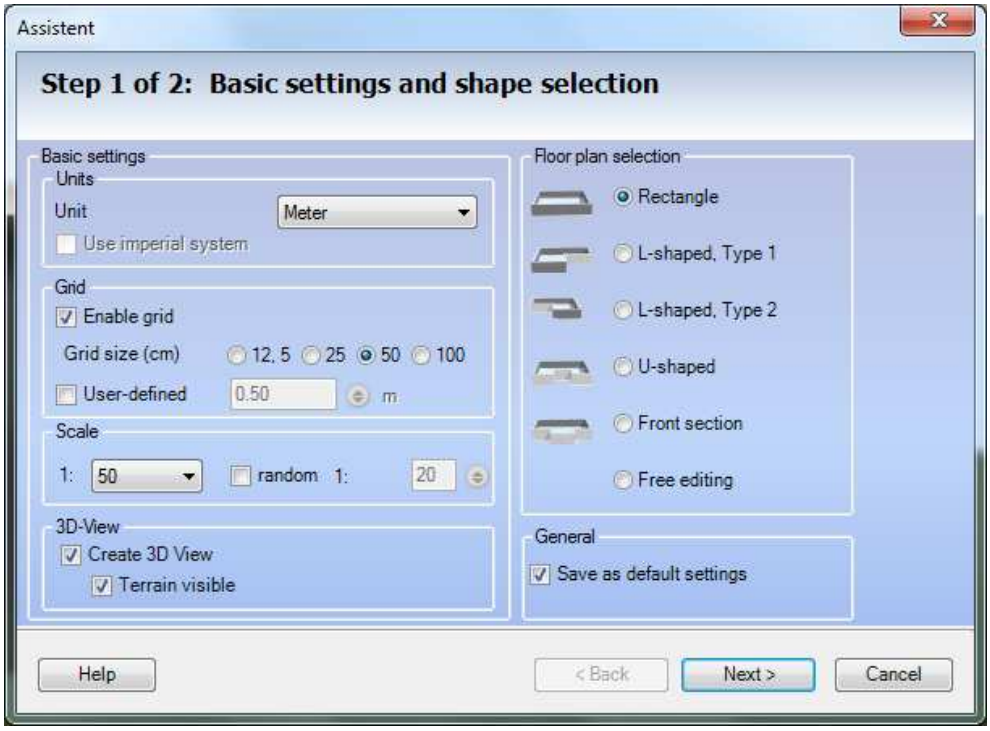
2.1 DESIGN OF THE BUILDING OUTLINE

Normally the software is started via the Start Wizard. You can access the sample projects and the training videos. It is also possible to start the project assistant.

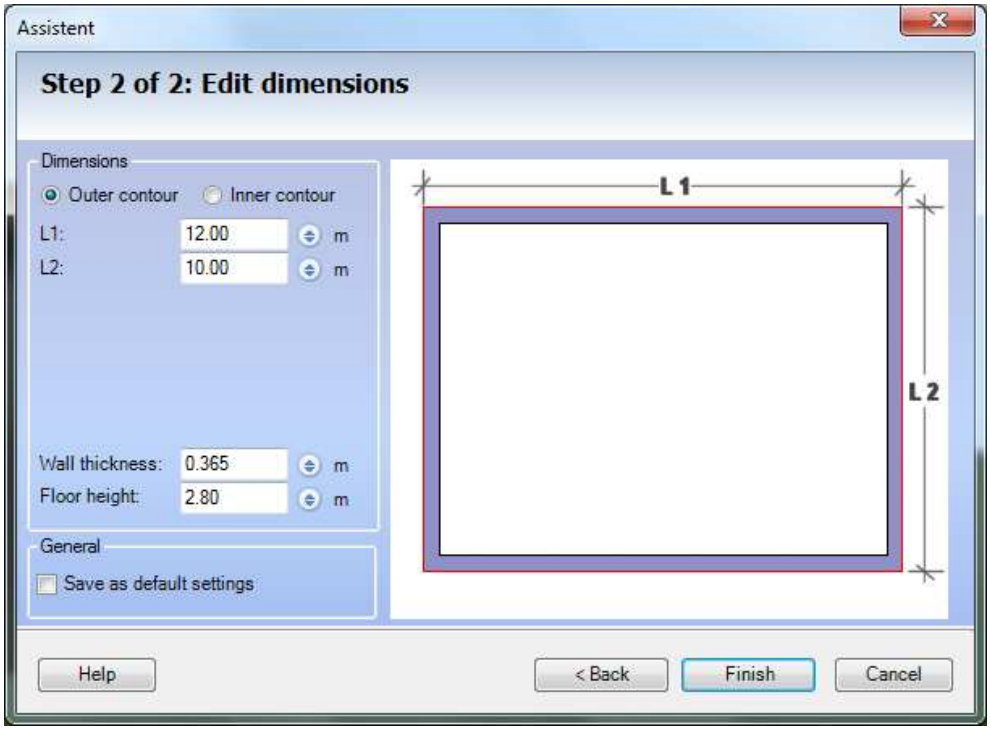


With the project assistant you can generate a new project in seconds. The scale and the units are predefined, so you can quickly generate a floor plan. See the building outline as an example.

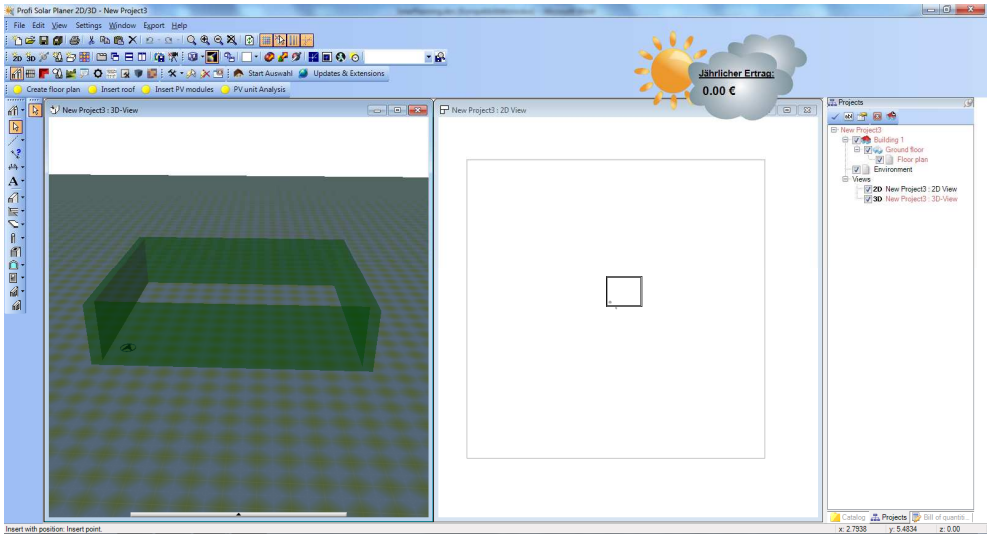
Step 1: Select the outline of the building from the predefined shapes. For example **Rectangle**



Step 2: Define the external measurements, the wall thickness and the floor heights.



Pressing the Finish button will create new project will be generated and the building outline preview attached to the mouse. With a mouse click in the 2D or 3D view you can place the building outline. During the preview you can change the reference point of the outline building by pressing Ctrl + W keys

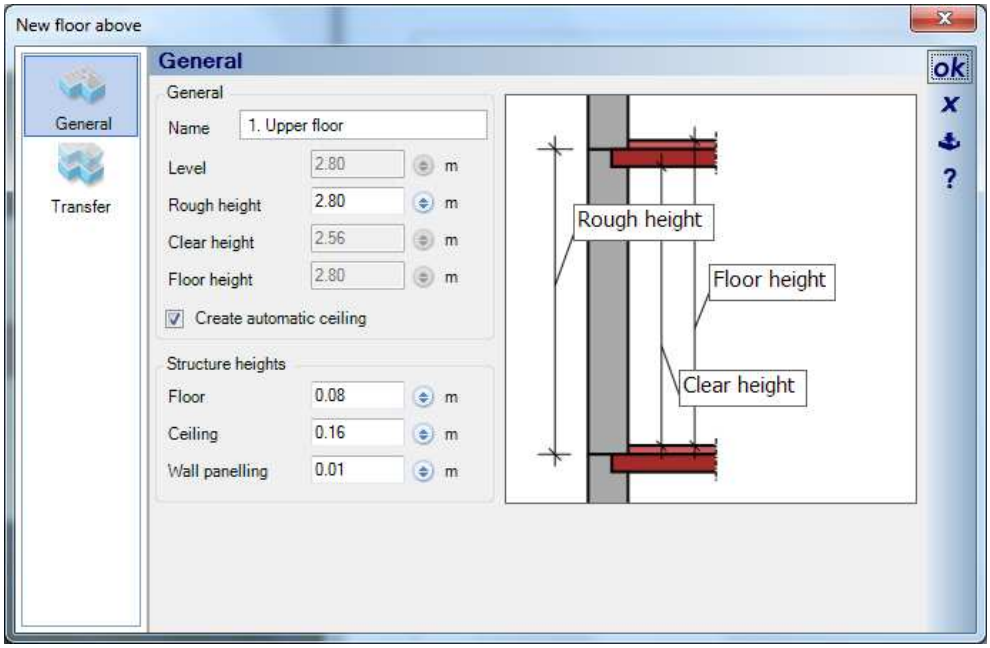


You then insert the building outline in the project with a left mouse button click.
The Assistant generates the numbers of walls to define the room. With the standard features of the CAD system you can also define all additional parts of the building (walls, windows, doors etc.). This is completely optional and does not affect the calculations.

2.2 COPY AN ENTIRE FLOOR

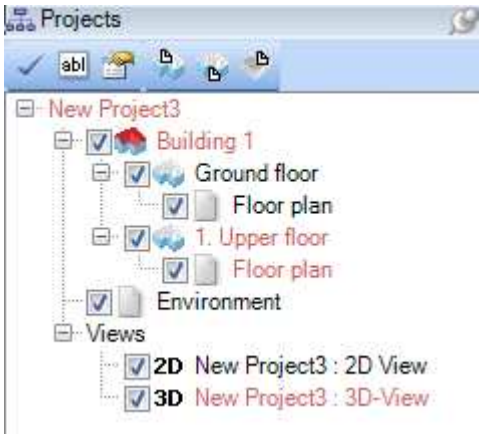
If you have a building with more than one floor, you can copy the active floor with a few mouse clicks.
Use the Project viewer on the right side of the window. The active floor will be shown in red. (In this example the Ground floor)
Select the building in the tree, here Building 1, and click the button **New floor above**

The New floor above dialog then appears:



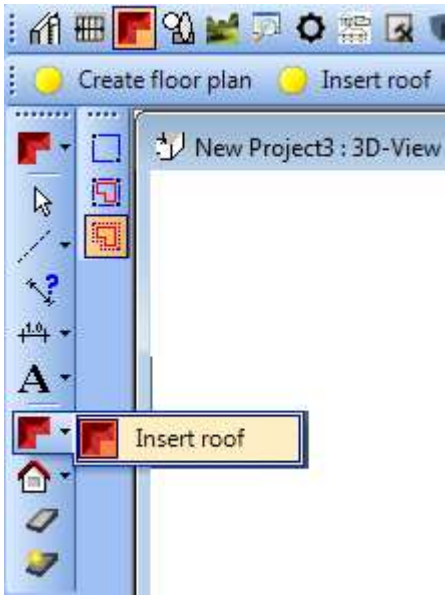
You can then choose different pre defined values of the new floor and define which items will be copied to the new floor. In this example the ground floor has only 4 external walls. So the select **All**

If the ground floor already has windows, doors etc included, you can decide to copy only the walls, floors and ceilings, and optionally the doors and windows. With **OK** you finish the dialog, the new floor is generated and the new active floor appears in the project viewer. If you insert elements, these elements are always included in the active floor of the project.

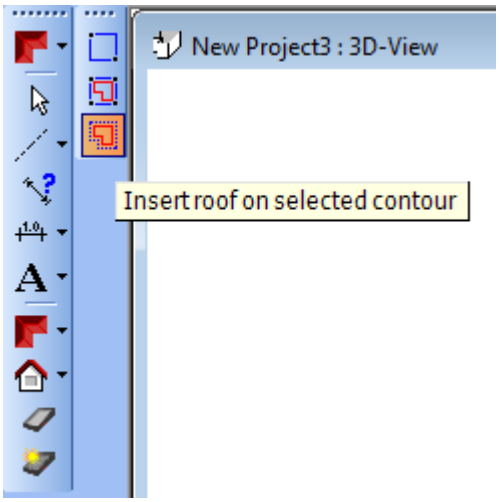


2.3 ADDING THE ROOF

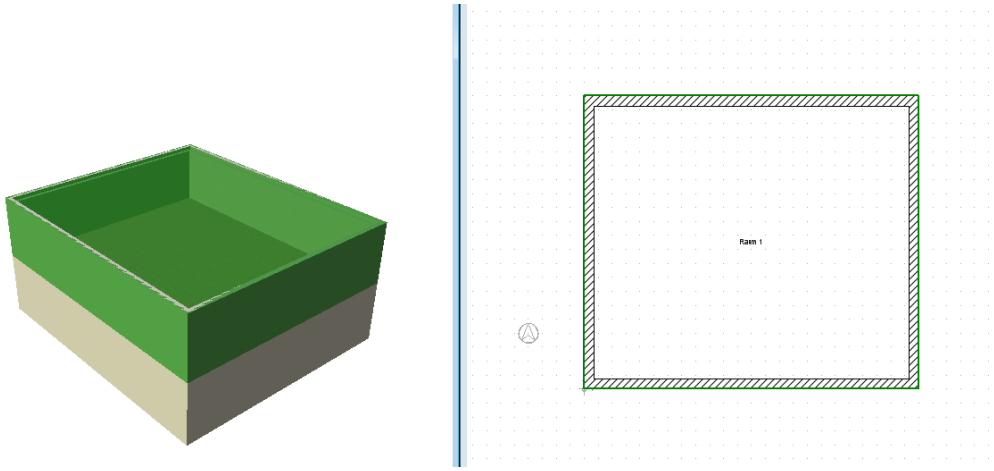
We now add a roof on the 1st floor. Activate the Roof-Plug-in and choose the function **Insert roof** .



In the **How bar**, (the second vertical icon bar), you can choose the different options for the roof. (Rectangle, Polygonal or Insert roof on selected contour)

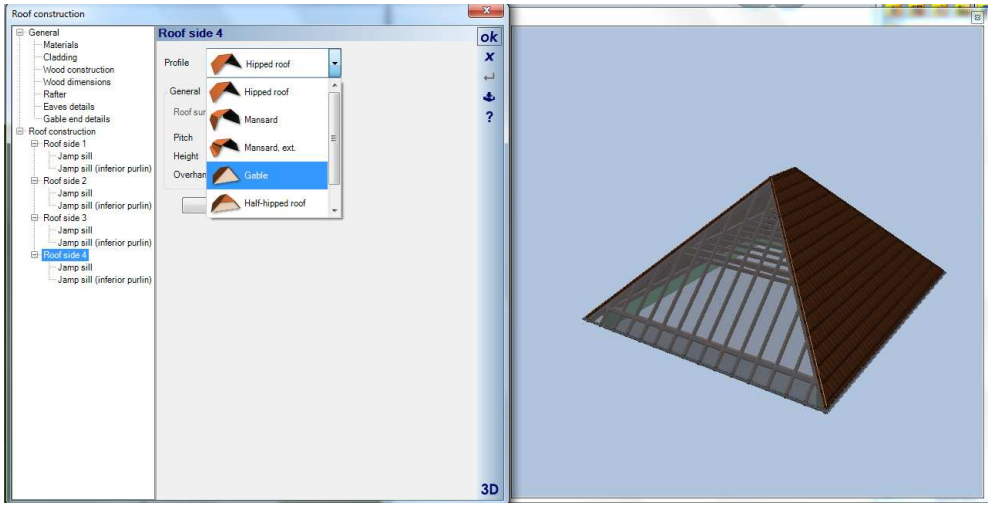


We choose the Insert **roof on selected contour** function and click the mouse on the building outline either in the 2D or 3D view. If a building outline is detected, it will be shown with a green frame.

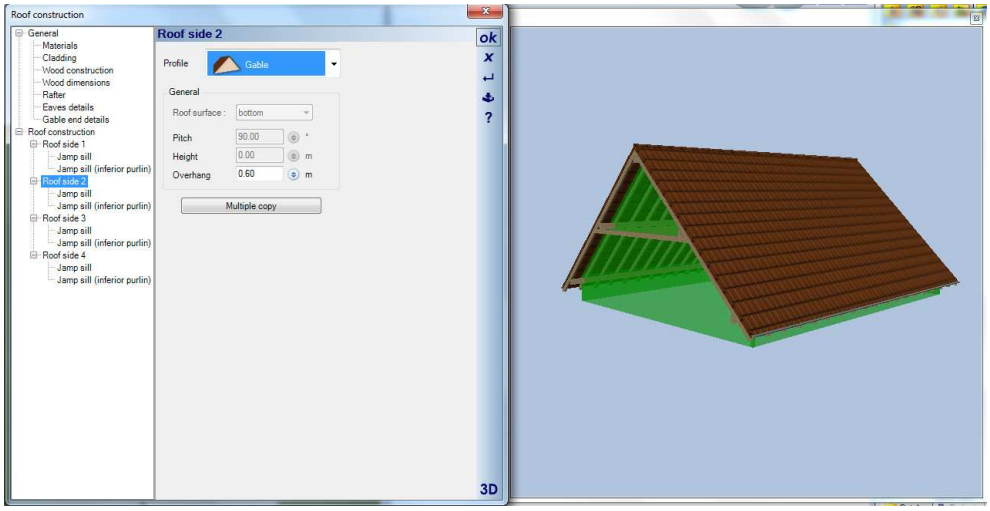


We then insert the roof with a left mouse click. A dialog will open, and you can choose the additional options for the roof.

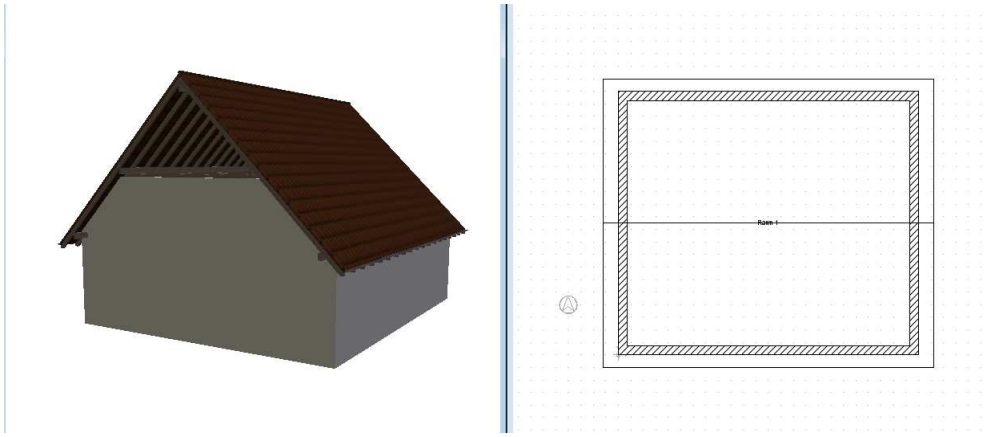
2.3.1 Adjust the roof side and pitch



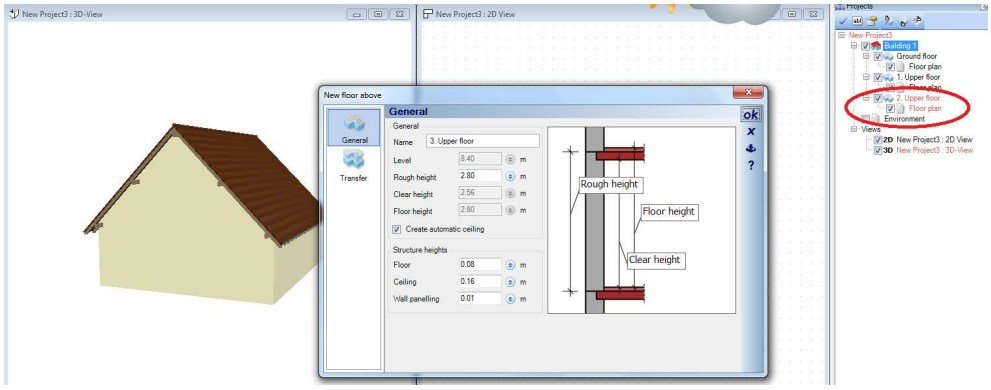
Click on the 3D icon in the lower right corner of the dialog to open the 3D roof image and click on a roof surface. You will see the properties of the roof side displayed and can change these properties including the pitch.
The example shows a pitched roof, which was created by specifying the two end surfaces as Gables..



Finish the function with **OK**, which then inserts the roof into the drawing.

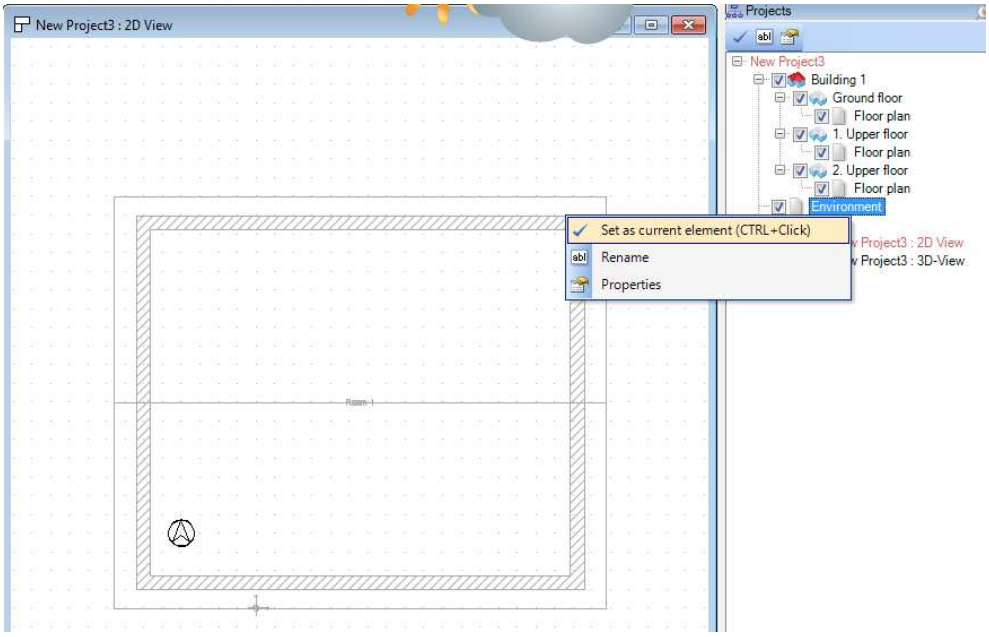


In the example you can see gaps on the gable ends. This happens, because the walls are set to a height of 2.8 m. We can either change the height of the floor, or insert an additional floor on top of the 1st floor.
This floor will close the gap, if the height is enough. We repeat the steps to copy a floor again and change the height of the floor to 4.00 m. The walls are by the roof. On the transfer page we select only walls, floor and ceilings. You have to de-select the roof; otherwise you will create an additional roof..

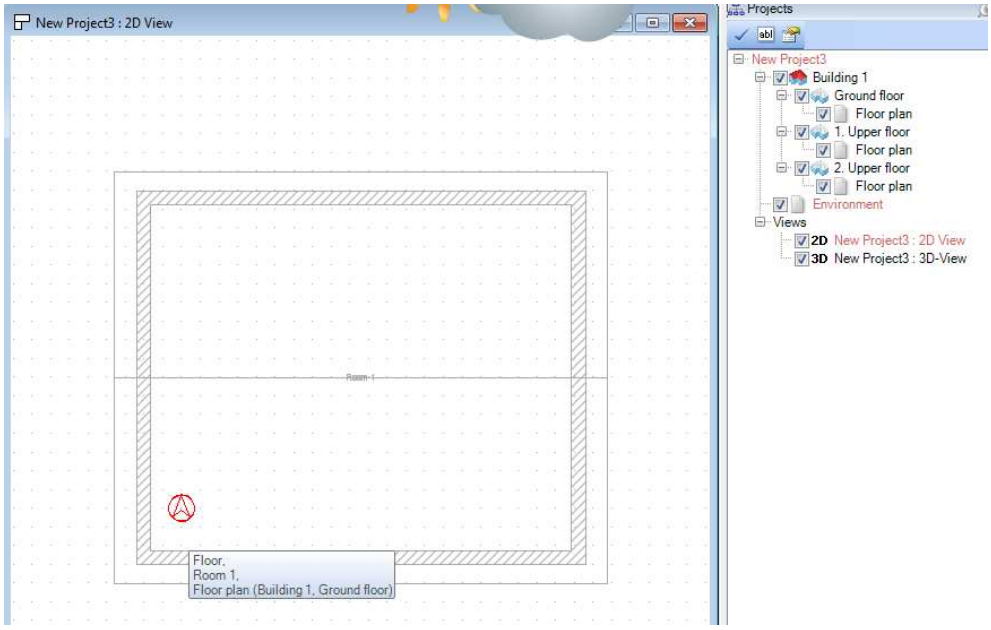


2.4 ADJUST THE FACING

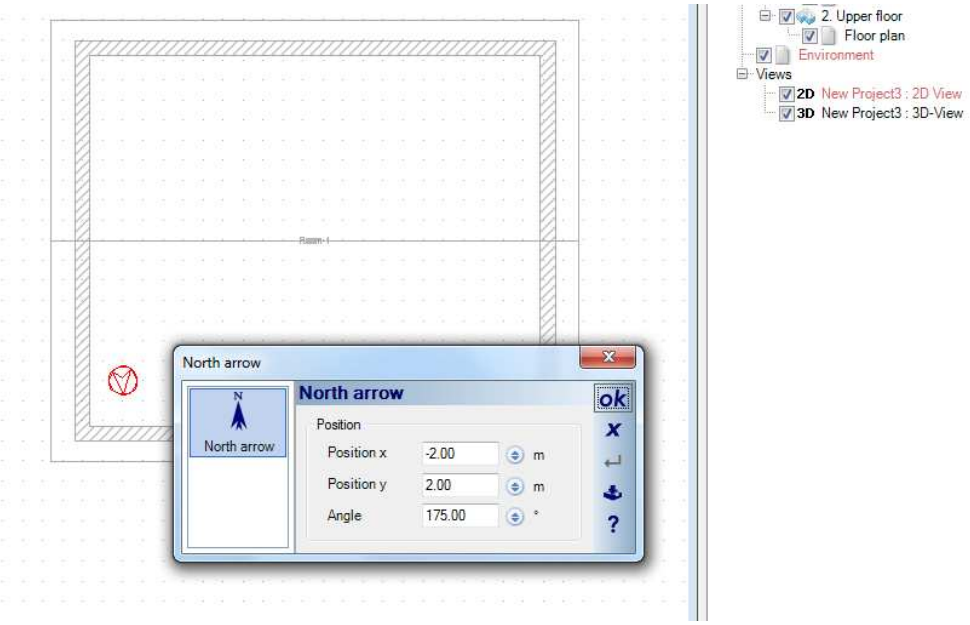
The geographical direction is defined by the compass. The compass is located in the environment layer and can only be changed if this layer is activated in the project viewer.
Activate the 2D View, change into the project viewer and activate the layer environment in the context menu activated with the right mouse button.



As result the building is greyed, because it is on another layer, not the active layer. The compass can now be selected by a mouse click.



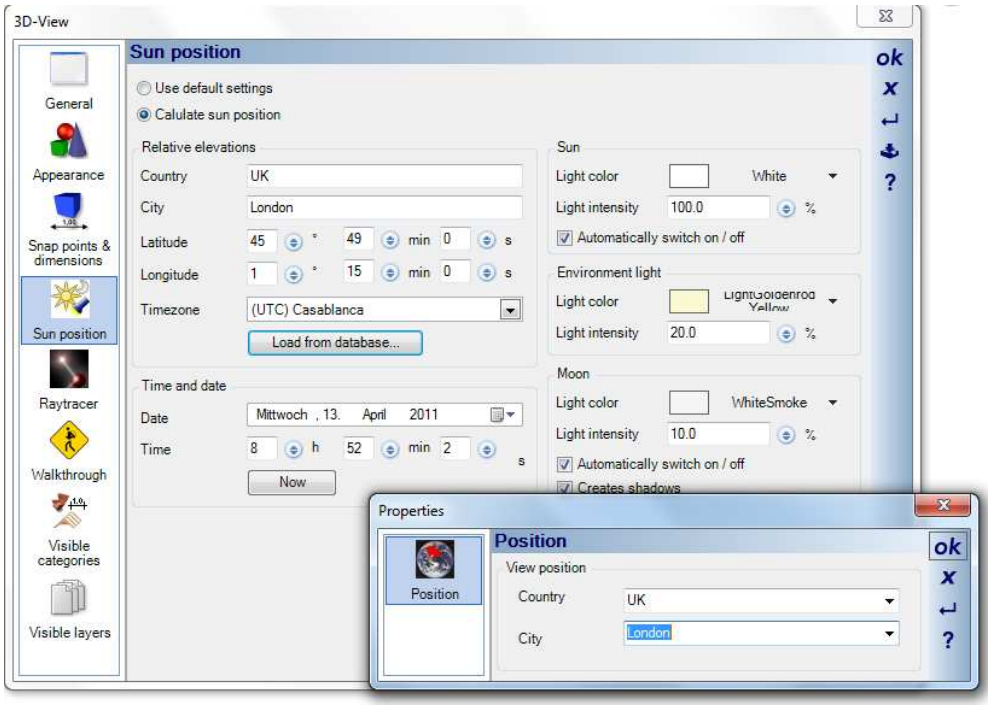
Open the properties dialog of the compass with a double click or use the context menu with the right mouse button. You can now rotate the compass.



2.5 DEFINITION OF THE LOCATION

For the shadow calculation, you can specify the location of the building.
Note: For the calculation of the solar gain you have to define the global irradiance of the location using the enclosed map. The definition of the location is a property of the 3D View. Click with the right mouse button in a

free area of the 3D view and open the property dialog. You can define the position of the building with the input on the sun position page (longitude and latitude) or choose a position from the database.

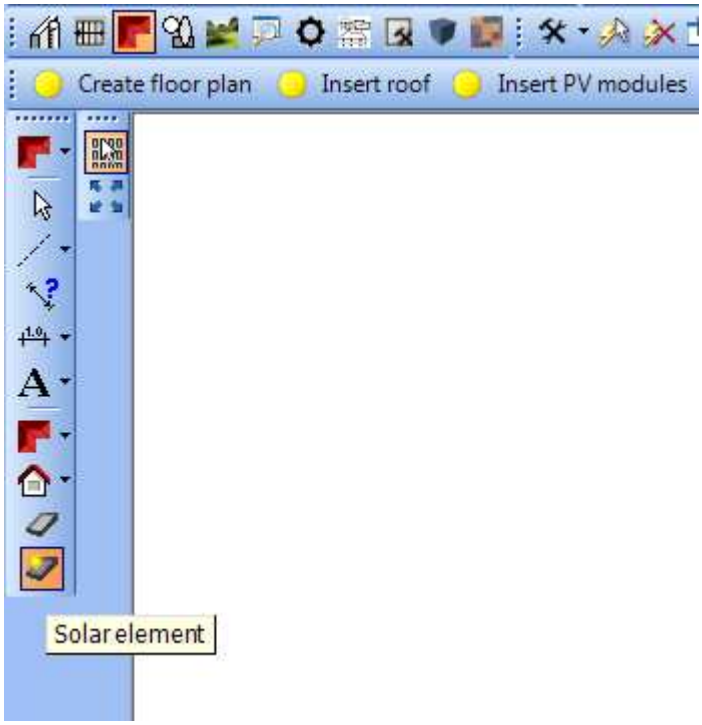


Alternatively you can define this data in the menu settings – 3D View and save as standard. If you save the settings all new 3D views work with these settings. If you do not save the settings you lose the information when you close the 3D view.

2.6 ADDING THE PV MODULES

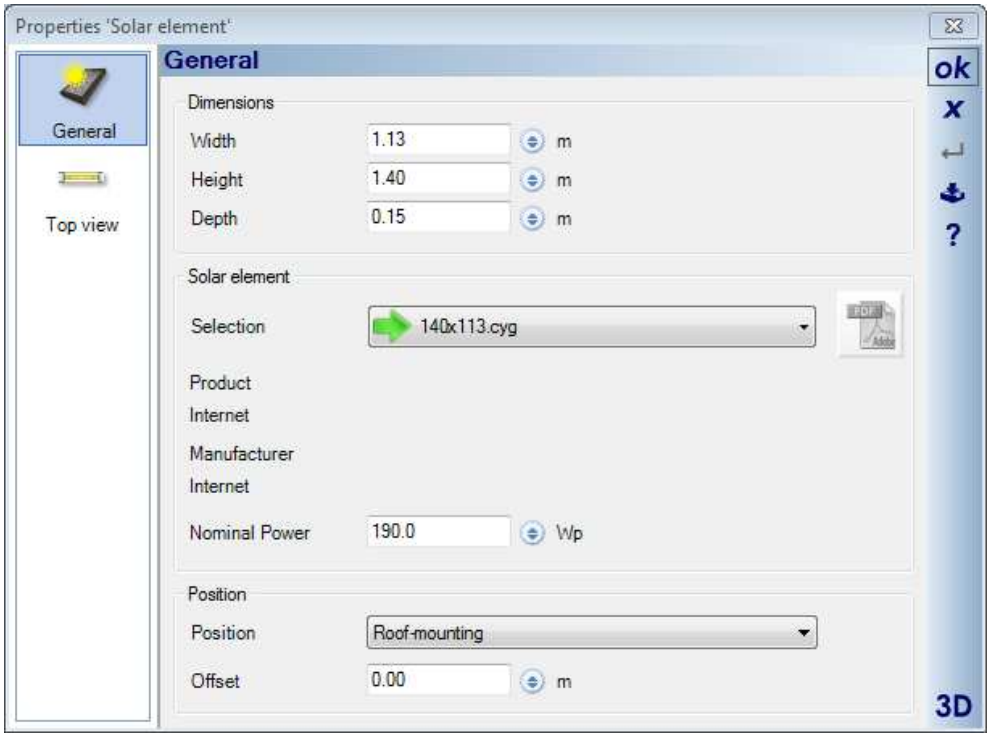
For the input of the PV modules you use the PV Plug-in. (activated by the **Solar elements** button in the What vertical toolbar)

In the category **Solar elements** you can choose Thermal Solar modules or PV modules.

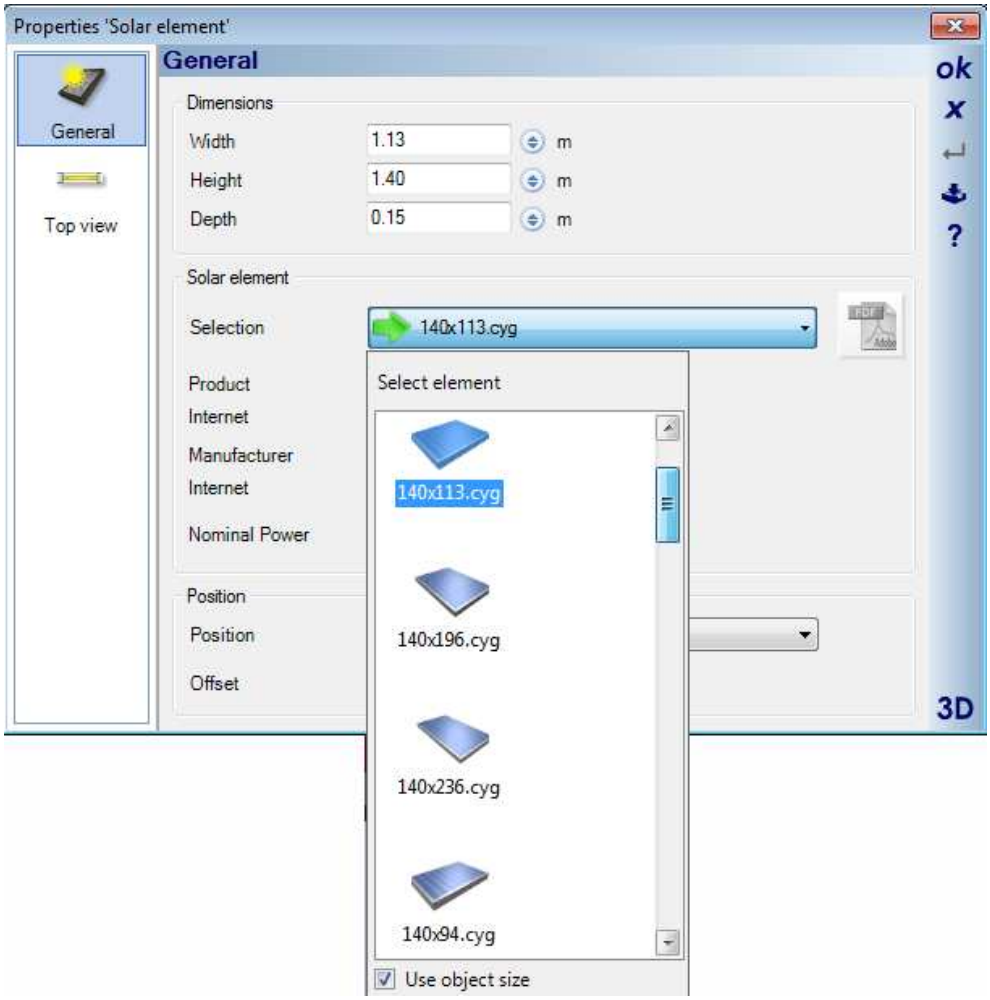


2.6.1 Properties of PV Modules, nominal power, dimensions

You can access the properties dialog of a solar module with a right mouse button click on the button **Solar element** or during the positioning of the modules click and the context menu activated with a with a right mouse click.
In both cases the solar element dialog opens.



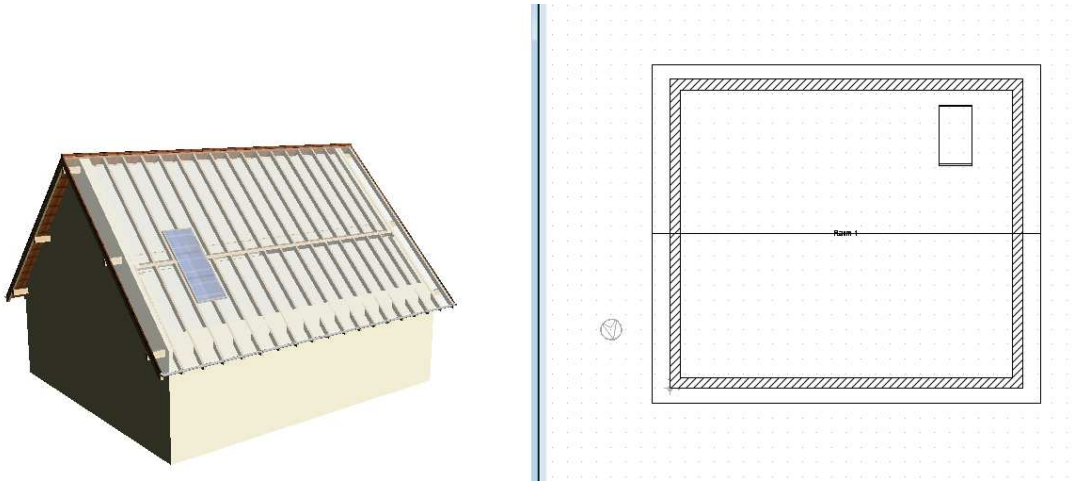
You can choose the dimensions of the modules, the nominal power and the type of fixing. You can choose different modules from the catalogue.



If the exact model that you are using is not in the list then choose a model that is similar to the one you want to use, and then modify the properties.

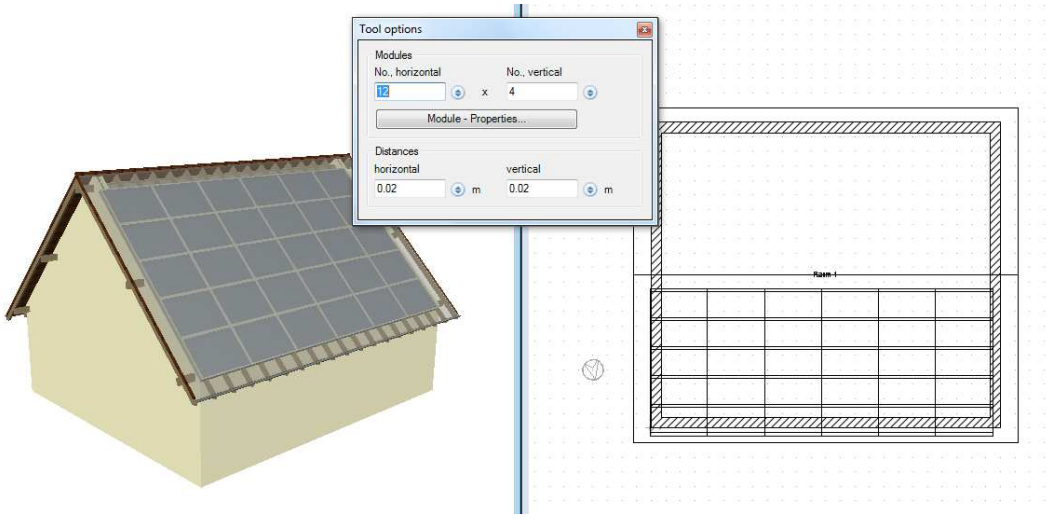
2.6.2 Placing single solar modules

After changing the properties of the module you can place the module in either the 2D or 3D view with a click of the left mouse button. You can see the chosen module with the real sizes as preview.



2.6.3 Placing several solar modules in a grid

This tool can help you with a parameter dialog. You can use this dialog if you activate the tool **Place in grid**. You can see a preview if you hover the mouse over the roof area.
As long as the modules are not placed, you can change the properties of the modules.



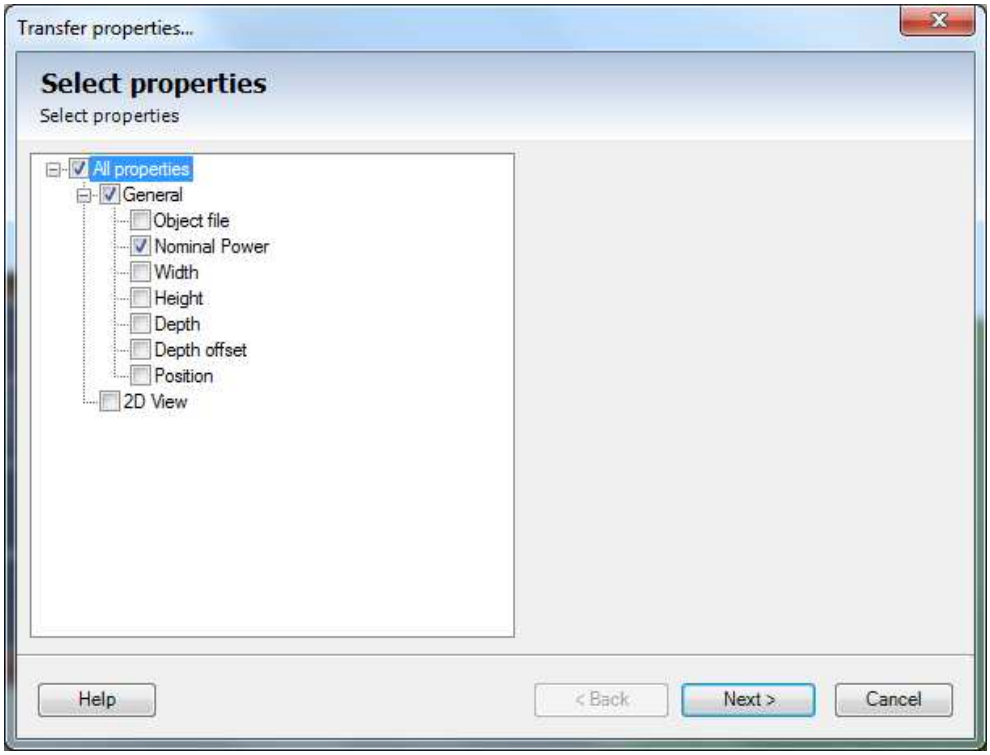
While the modules are attached to the mouse, you can change the reference points with Ctrl+W key combination. When the modules are placed, you can then make changes on each individual module

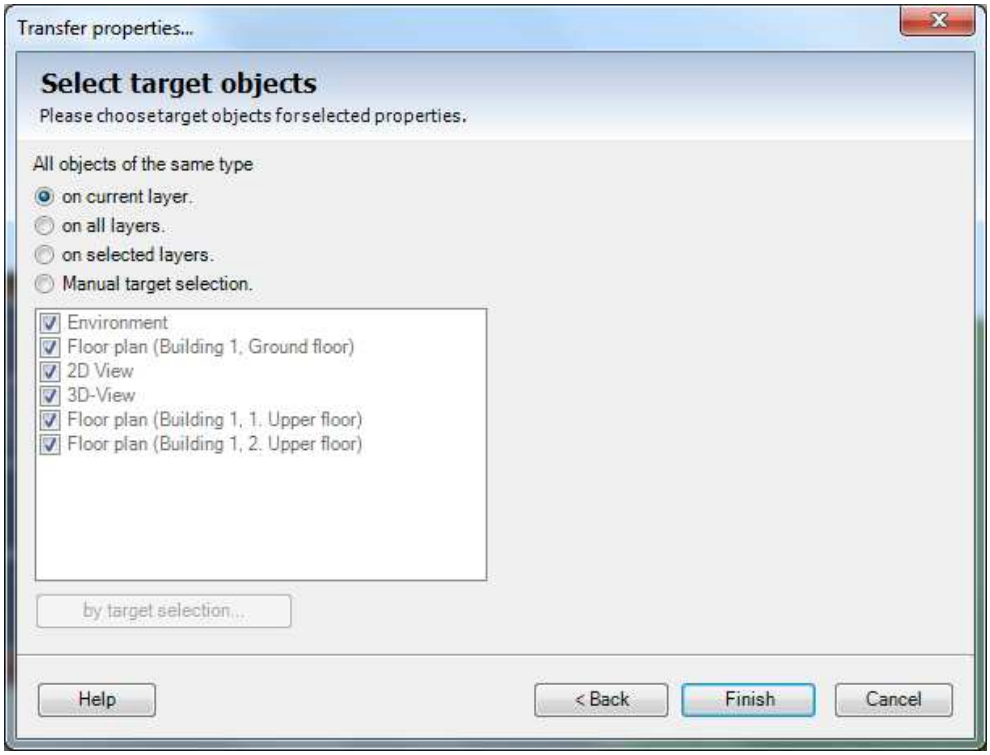
2.6.4 Later Changes of the nominal power and other properties

If you want to change the nominal power of the modules, to find the best system for your project, you can use the function **Transfer properties** from the context menu or the left hand toolbar, if a module is selected.

See the steps below:

- Select a module and open the properties dialog with a double click or via the context menu
- Change the nominal power or any other property
- Close the properties dialog with **OK**
- Select the module with the changes and choose **Transfer properties** from the context menu
- Choose the changed property, for example the nominal power from the dialog
- Then choose the area or layer where you want to transfer the properties to

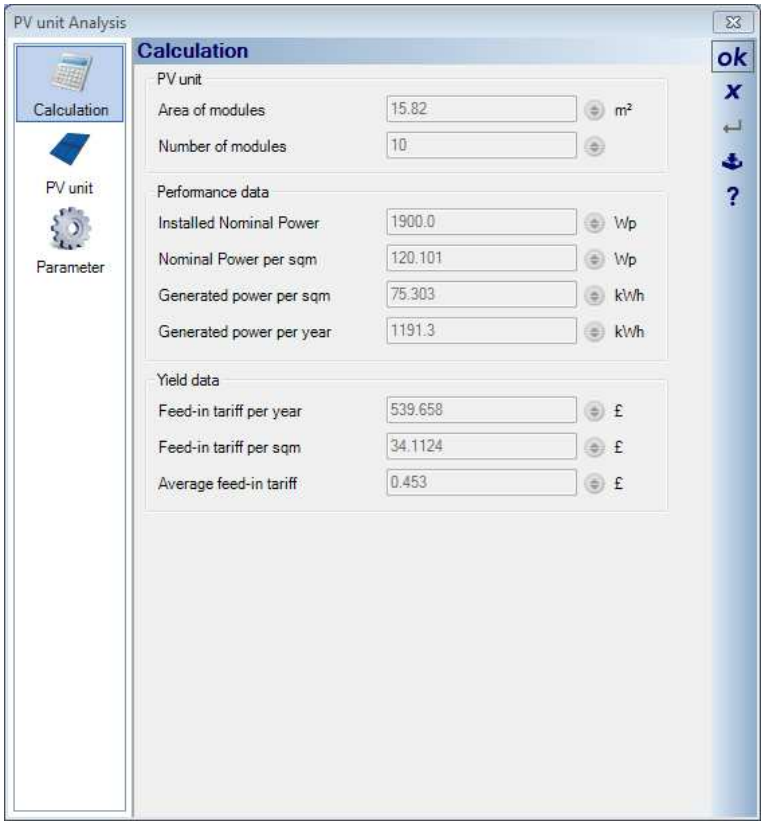




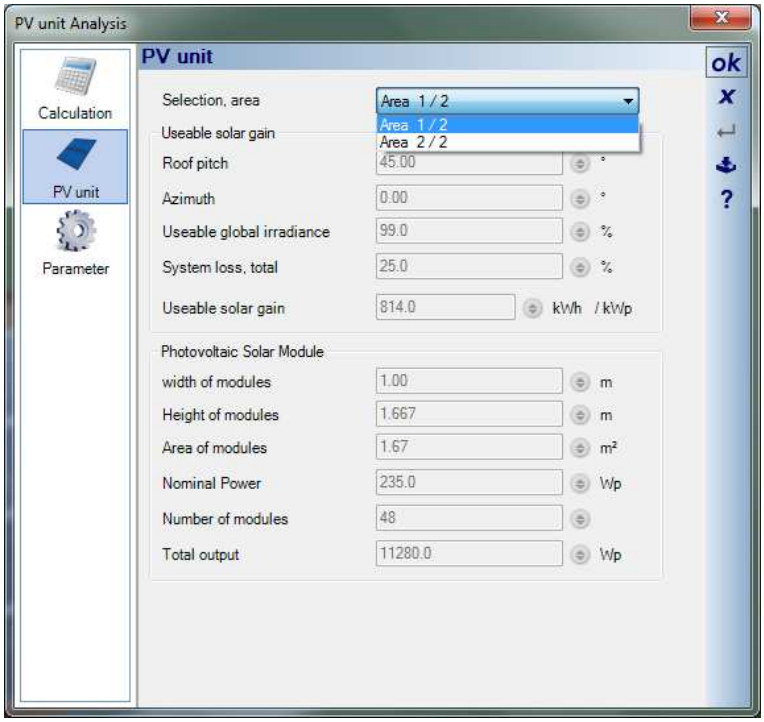
2.7 ANALYSIS OF THE SYSTEM

You can open the dialog for the analysis of the system with a click on the **Solar planer** button or double click on the info window

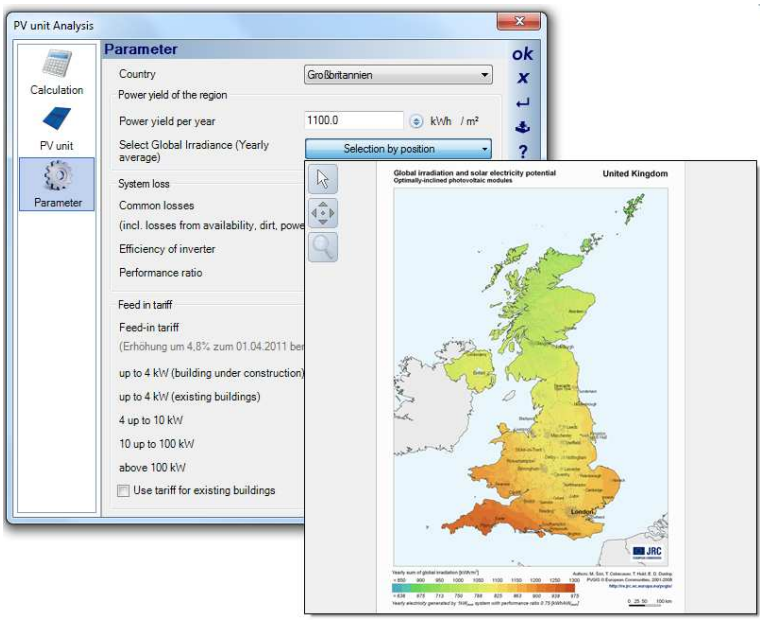
You have to make some additional settings to get a realistic result.
You can see the number of modules you have placed and the area.
The values for the solar gain etc. are calculated



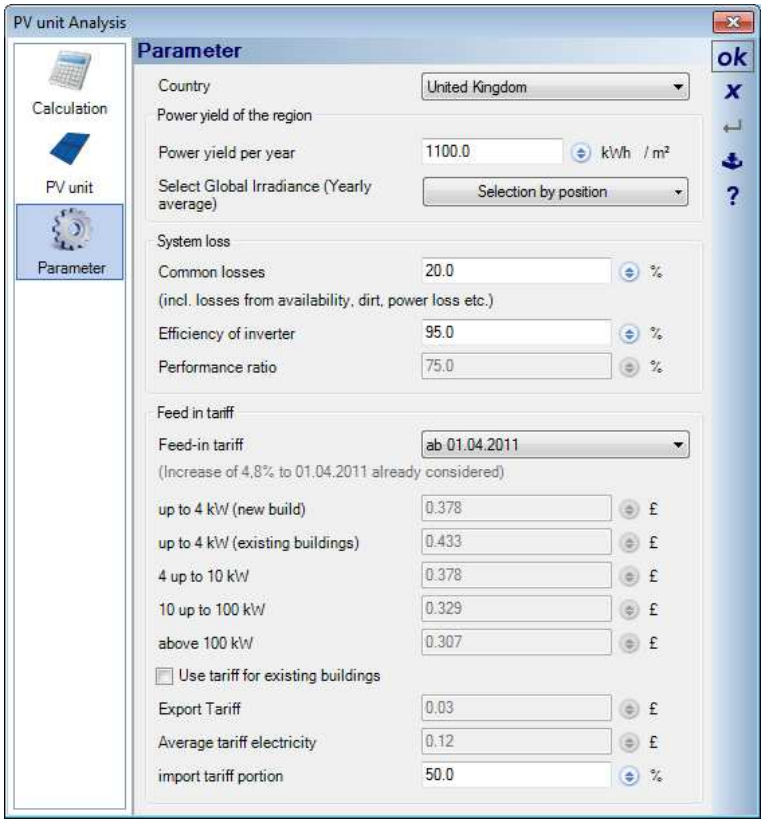
If you have several roof sides with PV modules you can choose each area from the list field. For each area the data will be shown. (Pitch, azimuth and solar gain)



The base for all calculations is displayed on the page **Parameter** page
You have to define the global irradiation for your area. This value can be sourced in different ways. (Internet, EU documentation)



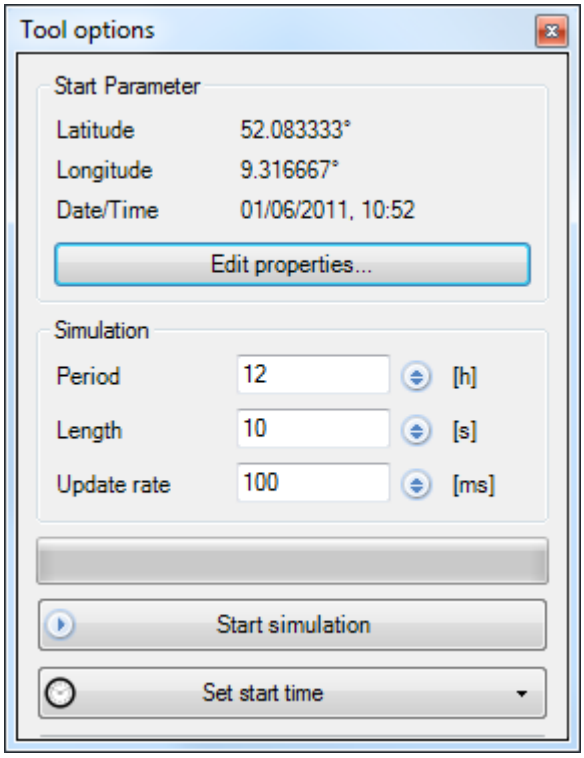
You can also choose a value on the map with the button **Selection location**. With the tooltip you can read the values while you drive the mouse on the map.



System losses influence the solar gain. You can get the information about the efficiency of the inverter from the manufacturer. The estimated availability is used for system defects like power failure etc.
Conduction losses are included as well.

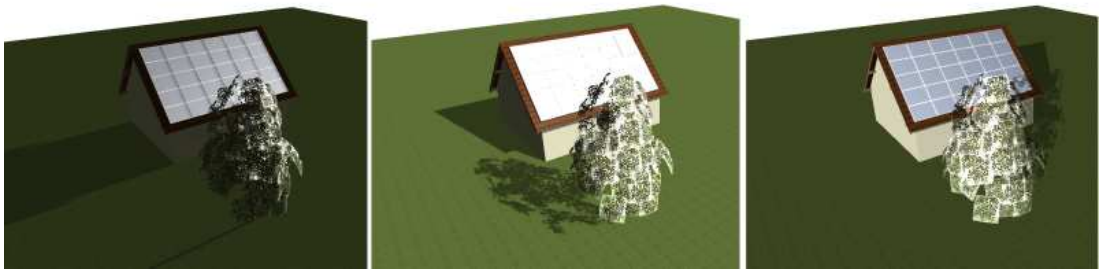
2.8 *SHADING* SIMULATION

With the button in the tool bar you can activate the shading simulation. With the tool dialog you can control the simulation.



First you define the location and the time. You define the period and time of the simulation.
With the button **Start simulation** you can start and stop the simulation.
You are able to use a time from a list below if you want to repeat a simulation.
You can delete entries by using the Del button, if the entry is selected.
In the simulation you can see the shadows over the period you defined. So you can check if you have any problems with shading on your PV modules. You are able to define all environmental items in detail, and can change the sizes of trees, adjacent buildings etc.

See the example with 2 same positions on the 1st of September and the 31st of December.



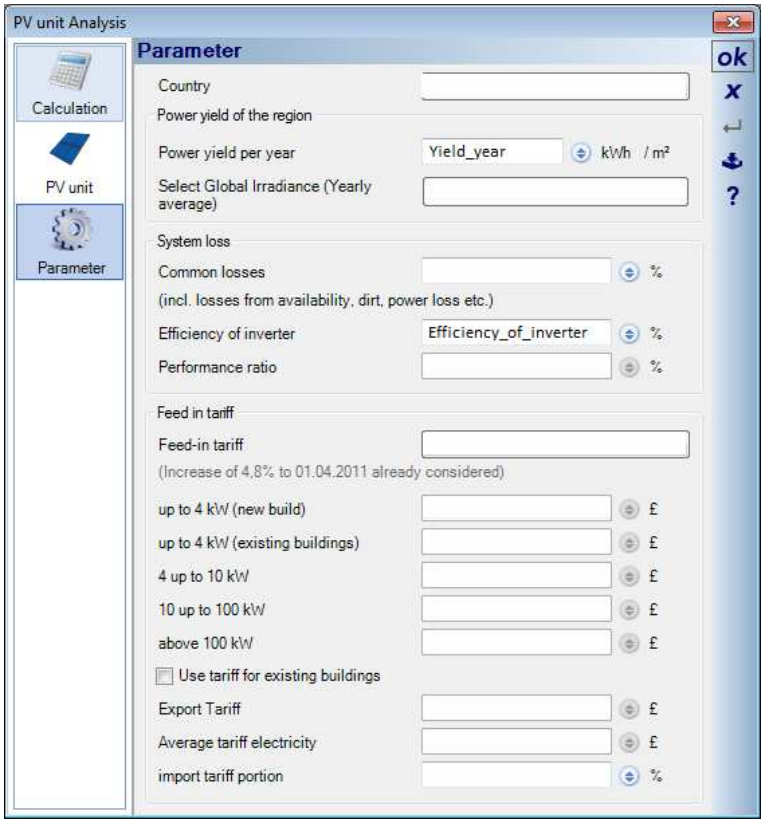
3 PV UNIT ANALYSIS

This dialog consists of three panels:

- Parameter
- Calculation
- PV Unit

3.1 PARAMETER

This is the first panel you should examine, as it contains additional settings that need your attention.

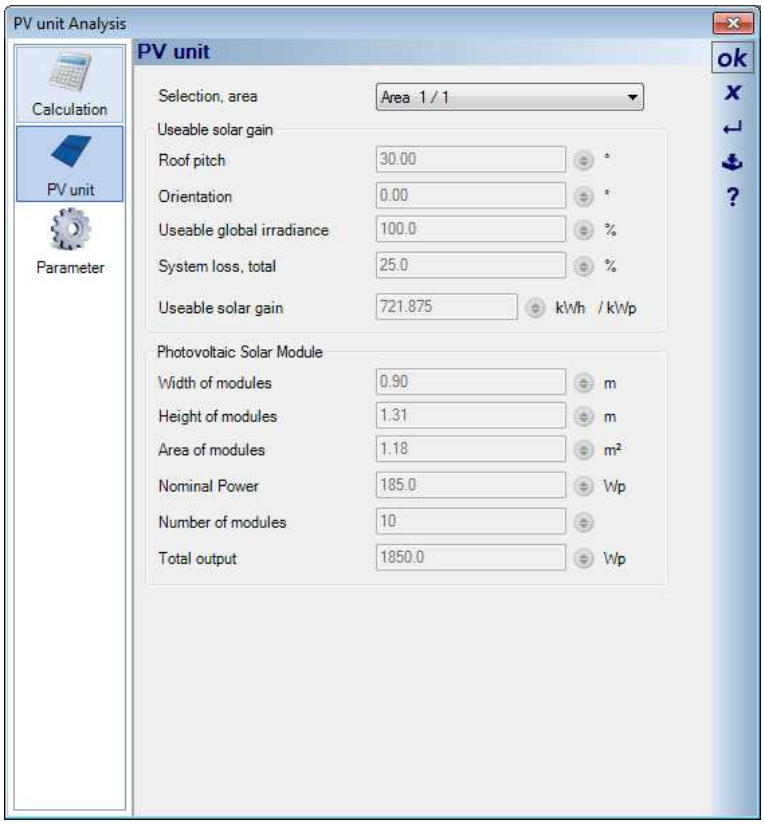


Country must be defined on order to specify the correct map from which you can specify your **Global Irradiance**

Power yield per year is the average annual solar radiation depending entirely upon location. This value can be determined by clicking on the map. In the UK the annual average power yield per year ranges between 950 and 1250 kWh/m^2

3.2 PV UNIT

The values displayed in this panel are specific to each array, if more than one array is installed on different roof surfaces. Two arrays on one roof surfaces are treated as a single array.



Selection Area

In some projects you may need to define several arrays, possibly on different roof surface with different orientation and pitches. This drop down list allows you to select the different areas that the information on this dialog refers to. Normally there is only a single array and so this is Area 1 / 1

Roof Pitch

The **Roof pitch** value is used to calculate the **Useable solar gain**. Nominally set to 30 degrees. (The optimum tilt relative to a horizontal surface of a solar panel at 1200 on either equinox is calculated as equal to your latitude. An optimum tilt value for winter can be adjusted by -15 degrees.)

Orientation
This value is determined by the compass. When the roof surface faces South the orientation is 0, when facing North the orientation is 180 and when facing either West or East the orientation is 90. The **Orientation** is used to calculate the **Useable solar gain.**

A 30 degree pitch West or East facing roof drops the **Useable solar gain** to 82% of a South facing roof., and a 30 degree pitch North facing roof surface roof drops the **Useable solar gain** to 61% of a South facing roof.

A 45 degree pitch West or East facing roof drops the **Useable solar gain** to 77% of a South facing roof., and a 45 degree pitch North facing roof surface roof drops the **Useable solar gain** to 47.5% of a South facing roof.

Useable Global irradiance
This value is determined by roof pitch and orientation and is nominally 100% for a south facing roof at a 30 degree pitch.

System loss
The System loss is calculated from the **Efficiency of the inverter** and the **Common losses**

Useable solar gain
This is calculated from the **Power yield per year** less system losses

Width of modules
The width of a single module unit. This value is derived from the dimensions entered into the panel object.

Height of modules
The width of a single module unit. This value is derived from the dimensions entered into the panel object.

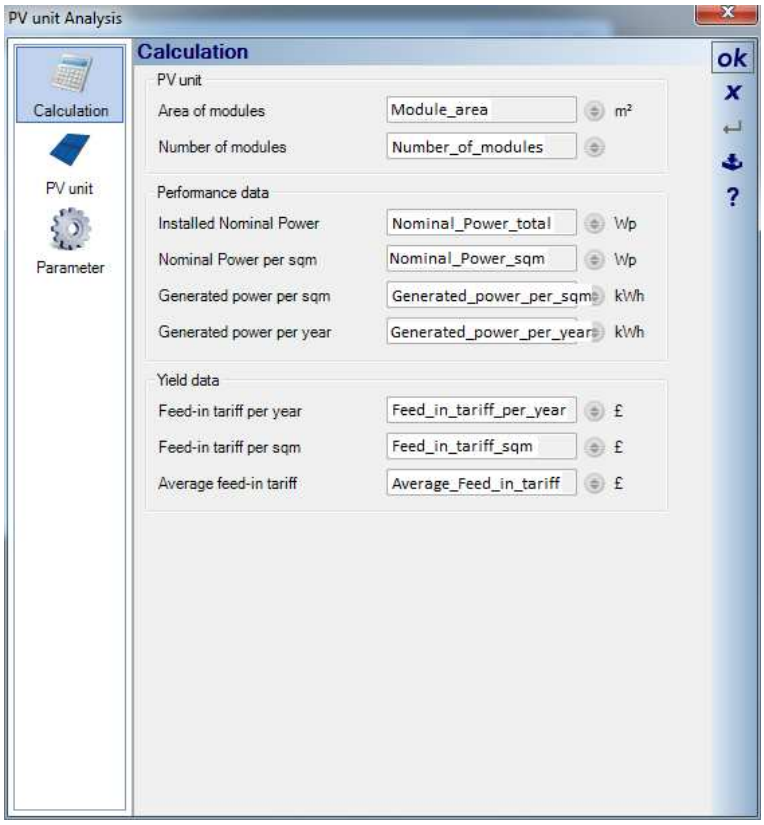
Area of modules
The area of a single module unit

Nominal Power
The **Nominal Power** is derived from the value entered into the panel object fot the solar module used on this specific roof surface

Number of modules
This value is derived from the number solar modules placed on this specific roof surface.

Total output
Calculated from Solar module **Nominal Power** x **Number Panels**

3.3 CALCULATION



Area of modules

Calculated from **Panel Width** x **Panel Height** x **Number of Modules**

The **Panel Width** x **Panel Height** are derived from the dimensions entered into the panel object.

In the report generator this value is represented by the **Module_Area** variable

Number of Modules

The **Number of modules** is derived from the number of panels placed on the roof.

In the report generator this value is represented by the **Number_of_Modules** variable

Installed Nominal Power

Calculated from **Nominal Power** x **Number of Modules**

The **Nominal Power** is derived from the value entered into the panel object.

Nominal Power per m^2

Calculated from **Installed Nominal Power / Number of modules**

In the report generator this value is represented by the **Nominal_Power_total** variable

Generated Power per m^2

Calculated from **Generated power per year** / **Area of solar modules**

In the report generator this value is represented by the **Generated_Power_per_sqm** variable

Generated Power per year

Calculated from **Installed Nominal Power** x **Power Yield per year**

In the report generator this value is represented by the **Generated_Power_per_year** variable

Feed-in tariff per year

In the report generator this value is represented by the **Feed_on_tariff_sqm** variable

Feed-in tariff pr m^2

In the report generator this value is represented by the **Feed_on_tariff_per_year** variable

Average feed-in tariff

In the report generator this value is represented by the **Average_Feed_in_tariff** variable

4 CREATE A NEW SOLAR PANEL

4.1 CREATE NEW PANEL

Before you start, you will need the following details concerning your new solar panel:

Product Name
*Product web link
Manufacturer's name
*Manufacturers web link
*PDF specification file

Panel external dimensions (width x height x depth in cm)
Panel Nominal Power

*Additional text information you want to display about the panel
*Additional popup image you want to display about the panel

*Optional

1. Create a new project (Ctrl + N)

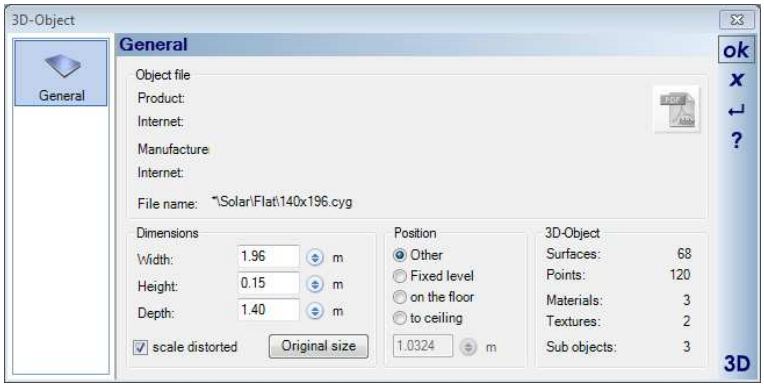
2. Create a 3D View of this new project (Alt+W, N), and arrange the windows vertically so you can view both windows.

3. In the catalog, select Construction element from the top catalog icon bar, then select the Solar modules catalog folder

4. From the catalog select any panel, and drag it into a new project (either into the 2D or 3D view) while holding down the Ctrl key down.

   Right click on the solar panel object and select properties.

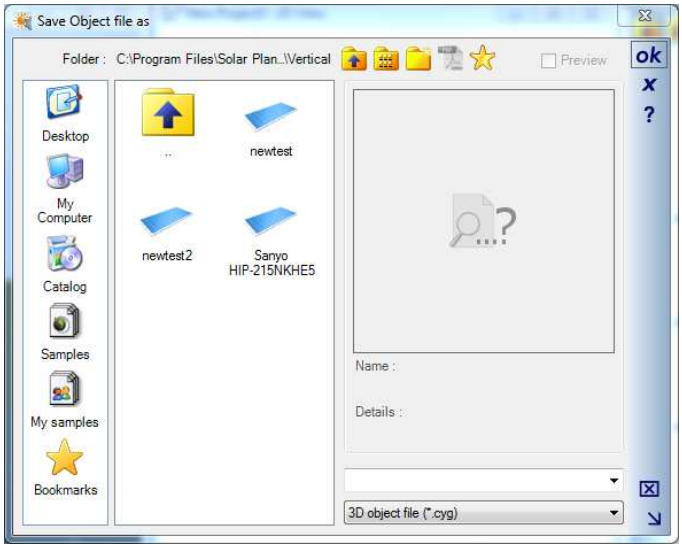
   You will see the existing properties for the existing panel, which we are now going to edit.



5. In the 3D Object Properties panel select the **Scale distorted** checkbox and adjust the **Width, Height** and **Depth**. Click **OK** to accept the edits.

6. Select the panel object in the 3D view, and then press Alt + x, 3, Return (selecting the Export menu, 3D Formats, 3D Object file).

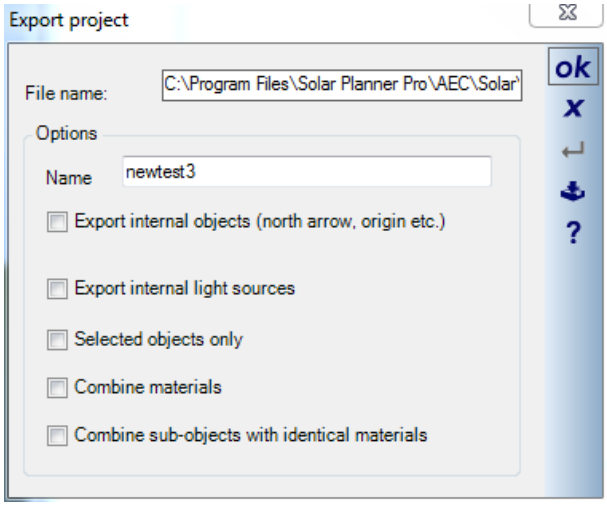
   This will activate the Save Object file as... dialog.



In this dialog navigate to Catalog/AEC/Solar Elements/Solar modules and navigate to the manufacturer's folder. (You can create a new folder for a manufacturer by selecting **Create New Folder...** in the top of this dialog, and then entering the Manufacturer's name.)

Enter the file name for your new panel, and select **OK**

The Export project is activated.



Select the following Checkbox:

Selected objects only
Combine materials
Combine sub-objects with identical materials

Add or edit the Name. This is the name that will appear in the catalog, not the file name.

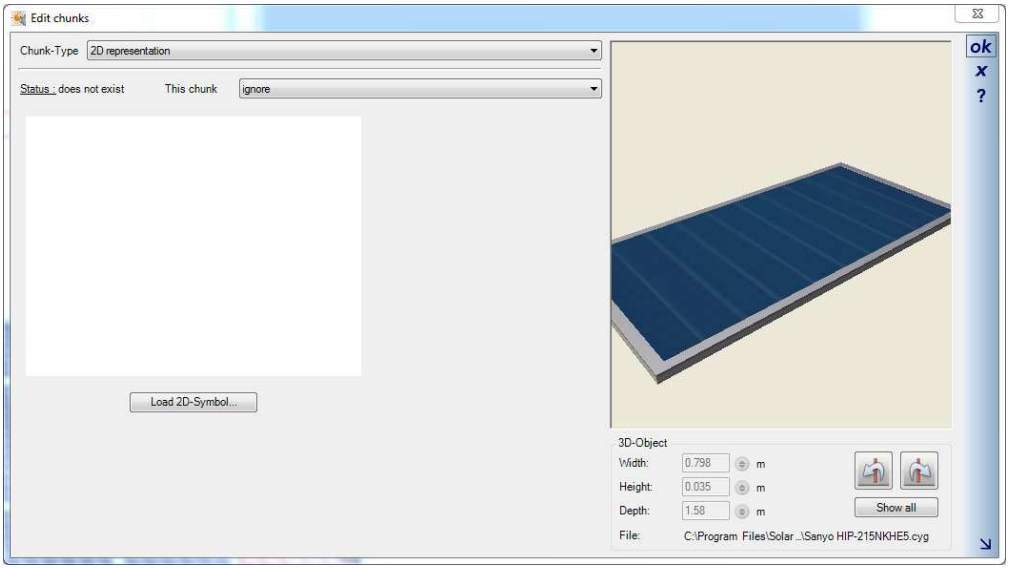
Select **OK** and the solar panel will be added to the Catalog.

You will need to navigate up and down a level in the catalog to refresh the contents to view the new panel object.

7. In the Catalog tab, select **Construction Elements**

8. In the catalog select **Solar modules,** and navigate to where you just saved you new panel object.

9. Locate your new solar panel and right click on it to activate the context menu, and select **Edit Chunks.** This will activate the Edit Chunks dialog:



10. From the ChunkType drop down list, select **Common information**

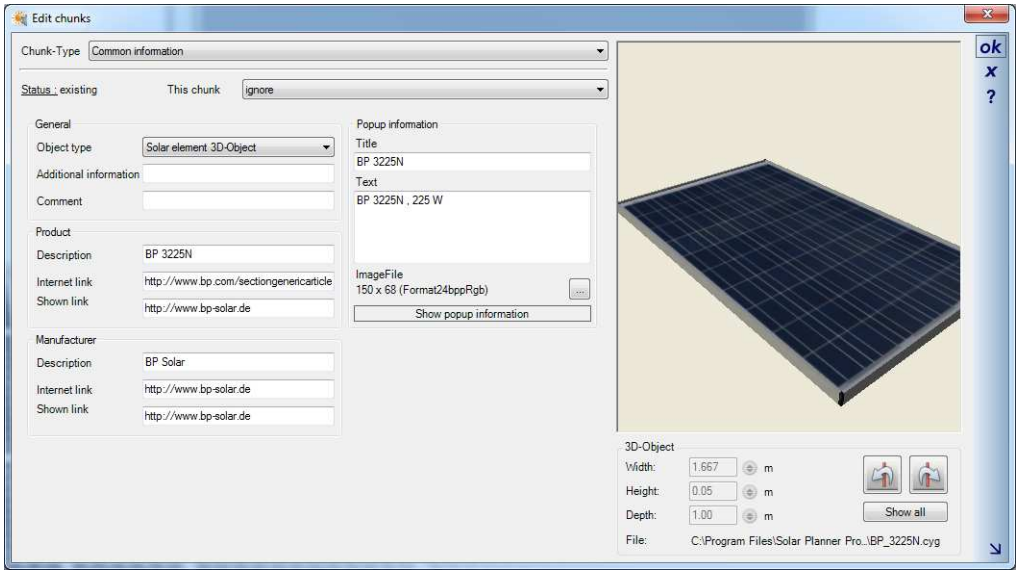
    Select **This chunk** drop down list to **Add or replace.** This is important otherwise your changes will not get saved.

    General Section
    Ensure Object type is set to Solar element 3D-Object

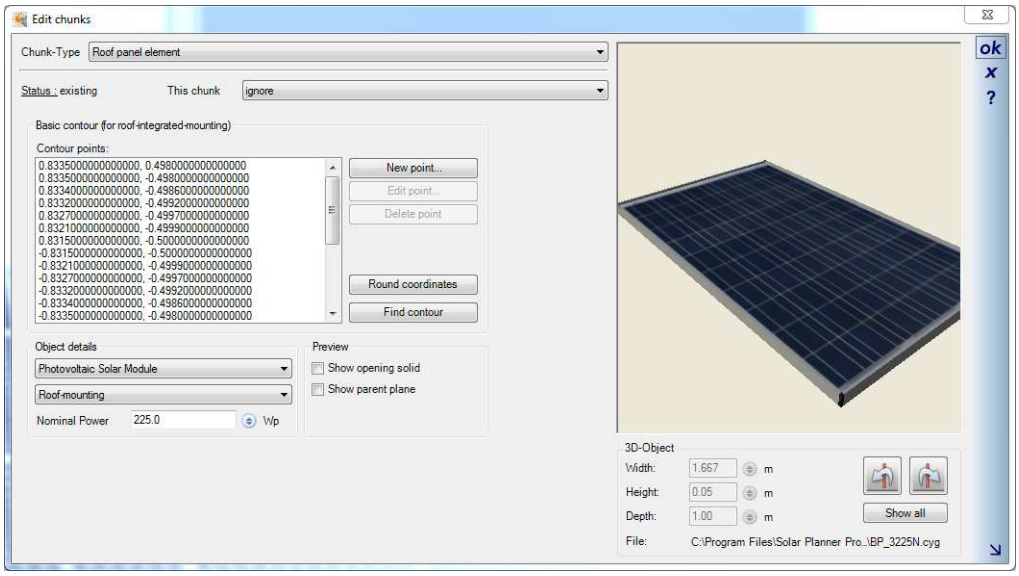
    Product Section
    This data will appear in the product information panel

    Manufacturer Section
    This data will appear in the product information panel

    Popup Information Section
    This data will appear in the product information panel
    The image file will appear as a pop up when mouse cursor hovers over object



11. From the ChunkType drop down list, select **Roof panel element**



Select **This chunk** drop down list to **Add or replace.**

The Contour points are used only for roof integrated mounting. This is ignored for Roof surface mounting.

If your panel is roof integrated, then select **Object details** to **Roof integrated mounting**.
You should also specify if your panel is a **Photovoltaic Solar Module** or a **Solar Thermal Collector**

For a **roof integrated mounting,** enable the **Preview** option **Show opening solid,** as this will then show the area defined by the contour points. The **Show parent plane** will display the roof plane in the preview window. The contour points are the area around the panel that is cut away into the roof. The points can automatically be generated by clicking on the **Find contour** button. The **Round coordinates**

will round the calculated values to 4 decimal places. You can edit individual points by selecting a point and selecting **Edit point.** The result of the edit is displayed in the preview window

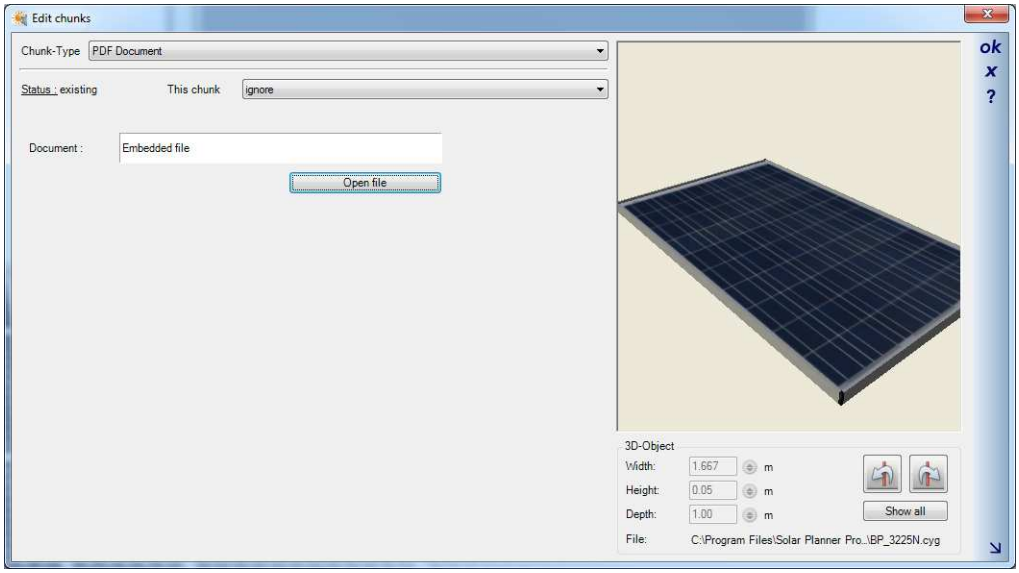
IMPORTANT: Add the **Nominal Power for** this panel. This is an important value as it is used in the output calculations.

12. From the ChunkType drop down list, select **PDF Document**

    Select **This chunk** drop down list to **Add or replace.**

    Select the pdf document via Open File button.

    You can attach a pdf file to the object. This pdf would normally contain additional product specifications.



13. Finally select **OK** to save the edits

    You have now created a new Solar Panel object.

14. You can allocate a icon to a new manufacturers folder by right clicking on the folder to activate the **Properties** context menu

You can edit the folder name.

You can load an image file to be used as an icon, by clicking on the image file. We recommend using a 128x128 image with a white background.

4.2 CREATE COPY OF EXISTING PANEL

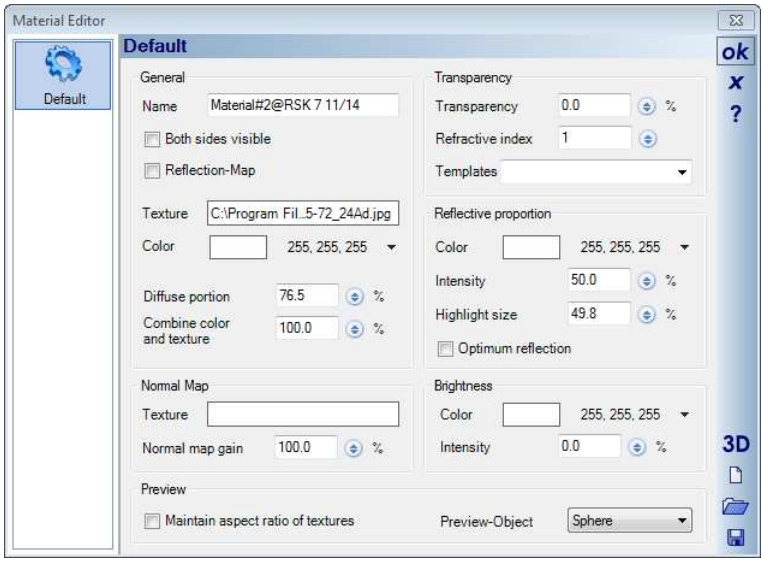
The previous section creates a new panel without retaining any of the original panel's values. If you are creating a range of panels with mostly the same values this can become tiresome.

You can also use an existing solar panel module and reproduce it several times replacing only the specifications that differ. For example a range of panels may have the same specifications and only the power output is different. The dimensions and the web links, and .pdf file all remain the same.

1. Copy the panel giving it a new file name (in windows explorer)
2. Use the **ChunkEditor** to edit the panels name and power
3. You will see that although you have a different file name, the catalogue name remains unchanged, so use the **3D Converter** to rename the catalogue name. **Run 3D Converter**
4. In the top file navigation window, navigate to the object you want to edit and load the object by selecting it.
5. In the bottom left properties panel, you can edit the Name and web links, and dimensions

Document	
Document	
Existing	False
File	
File name	C:\Program Files\Visual Building Solar Designer\AEC\Solar\Flat\Su
File size	13145
Information	
Manuf	www.suntech-power.com
Manufacturer - URL Text	www.suntech-power.com
Manufacturer Url	http://www.suntech-power.com
Product - Url	http://www.suntech-power.com
Product - Name	Suntech
Product - shown URL	www.suntech-power.com
Properties	
Depth	1.58
Height	0.035
Insert	Other
Level	-0.22499979957938193
Name	STP 190S-24AD+
Width	0.808
Scaling	
X-Scale	100
Y-Scale (%)	100
Z-Scale (%)	100
scale distorted	False

6. You can change the texture image of the panel by selecting the object centre texture and then activating the Material editor with the **Edit material** icon

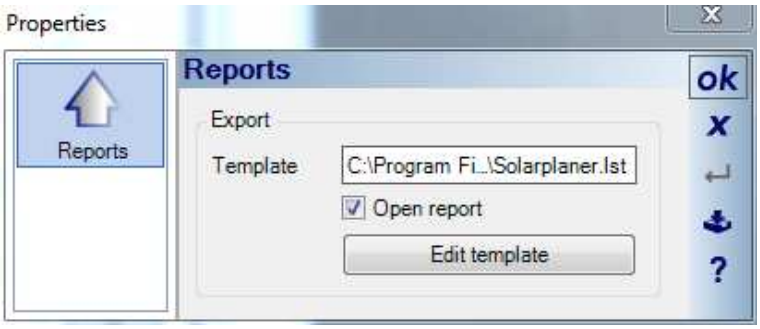


7. Select a new texture using the Texture field and then click OK
8. Then click on Save Object icon to save your edit panel object

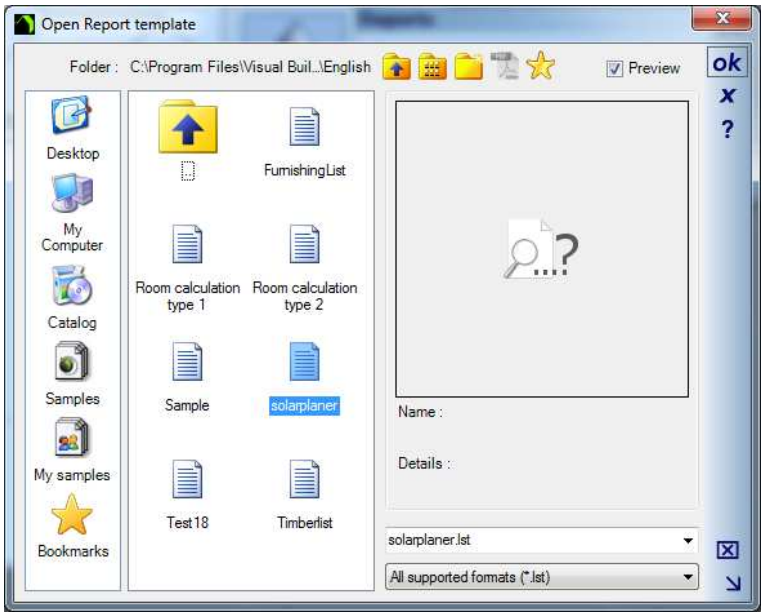
5 REPORTS

5.1 RUNNING A REPORT

Reports are run from the menu: Export/Reports/Reports/Solar Analysis menu and activates the Properties dialog:

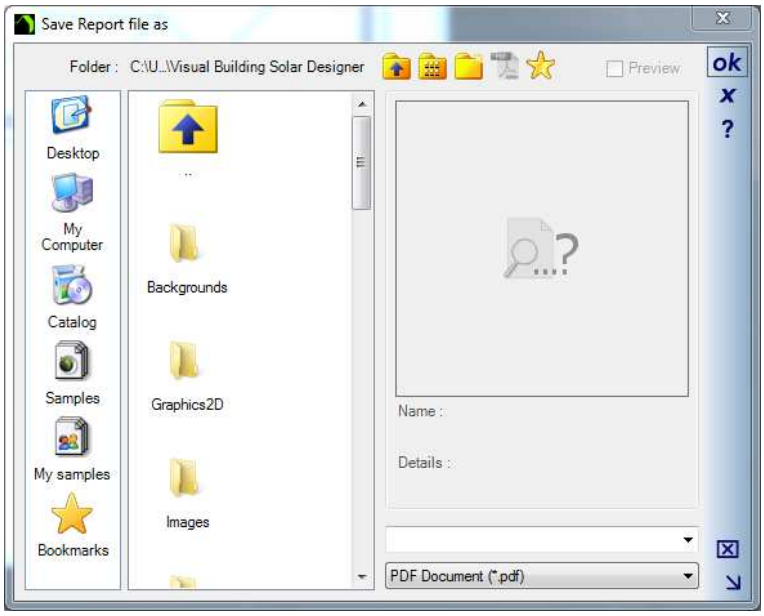


To select a report click on the Template path field. To activate the Open Report Dialog:

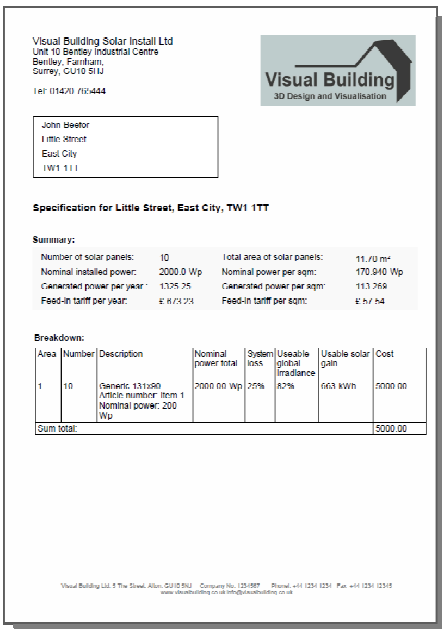


All reports are .lst files and care must be made to select only reports related to Solar panels, as reports for other parts of the system also reside here. We suggest you prefix all reports names associated with the

Solar Designer with Solar, eg SolarEstimation1.lst. You could also create a new folder to save your Solar reports into. To run the report select a report and then click OK. The Save Report dialog then appears:



This dialog is prompting you for a file name (default is .pdf, but alternative file types are html,xls and .rtf). The report is then displayed:


Visual Building Solar Install Ltd
Unit 10 Bentley Industrial Centre
Bentley, Farnham,
Surrey, GU10 5NJ

Visual Building
3D Design and Visualisation

John Beeton
Little Street
East City
TW1 1TT

Specification for Little Street, East City, TW1 1TT

Summary:

Number of solar panels:	10	Total area of solar panels:	11.70 m²
Nominal installed power:	2000.0 Wp	Nominal power per sqm:	170.940 Wp
Generated power per year :	1325.25	Generated power per sqm:	113.269
Feed-in tariff per year:	£ 874.23	Feed-in tariff per sqm:	£ 0.74

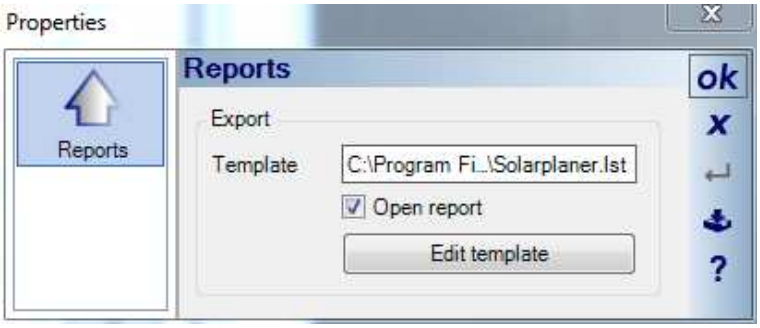
Breakdown:

Area	Number	Description	Nominal power total	System loss	Useable global Irradiance	Usable solar gain	Cost
1	10	Generic 1310x990 Article number: Item 1 Nominal power: 200 Wp	2000.00 Wp	20%	82%	663 kWh	5000.00
Sum total:							5000.00

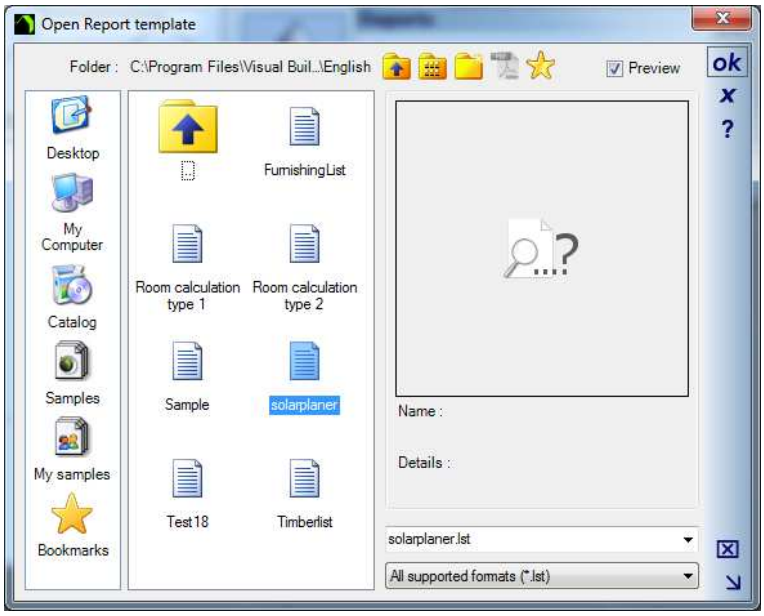
Note, if the report fails to display, please ensure that your pdf presentation program (eg Adobe Reader) is not already actively showing a report.

5.2 EDITING A REPORT

Reports are edited from the menu: Export/Reports/Reports/Solar Analysis menu which then activates the Properties dialog:

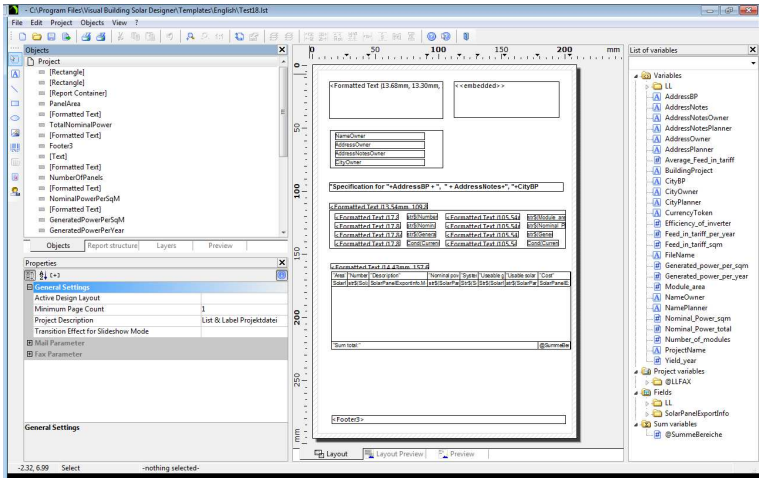


To select a report, click on the Template path field. To activate the Open Report Dialog:



Select the report to be edited and the select OK.

Now click on Edit Template, which will then activate the List & Label program, the report template editor.



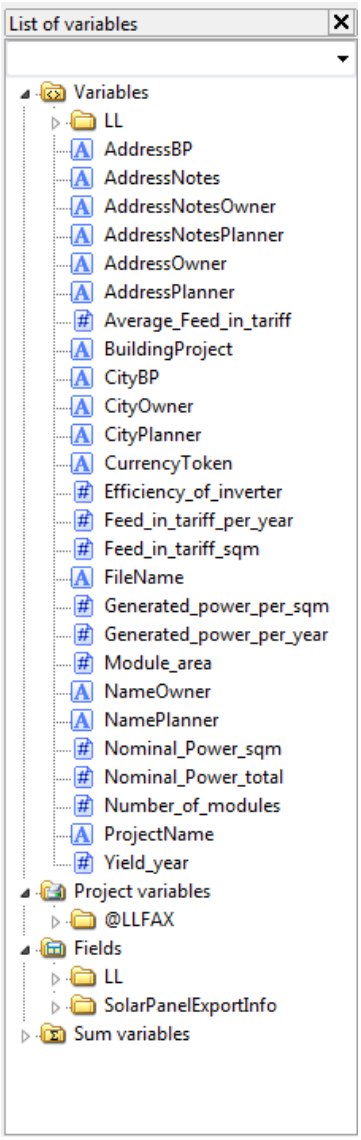
Overview of List & Label:

Object List Window

This where you create your objects to be displayed within your report (default left hand window)

Variable List Window

This window contains all the variables visible to List & Label. (default left hand window)



Layout Window

This is where you will place your objects to be displayer. (default centre window). This window also contains Layout Preview and Preview tabs.

5.3 CREATING A NEW REPORT

Normally it's easier to edit an existing report, rather from starting with a blank report, especially as most of your reports will contain the same variables, but with different calculations and layout.

If you do want to create a new blank report, then after loading an existing report, click on **File / New** (Alt + F, N). You should then save the new report template, to be sure not to overwrite the report that you loaded, using **File/Save As** menu (Alt + F, A) .

Be sure to save the file in:

C:\Program Files\Visual Building Solar Designer\Templates\English

5.3.1 Create a logo

For your company logo, please use a .gif or .png file. We also need to create a "Picture" object. Proceed as follows:

a) In the "Objects" toolbar, choose the "Picture" object type.

b) In the workspace, point the mouse to the position where the upper left corner of the object is to begin. The mouse cursor changes to a crosshair. Hold down the left mouse button and drag the crosshair to the lower right corner of the planned object. Release the mouse button when the object (the dashed border) is the right size.

c) A file selection dialog will appear. Select the image file that you want.

d) After you select the file, the logo will be inserted. In addition, you can insert the picture into the project by enabling the ("Embed image in project file" checkbox option. This option copies the image to the project thus making it available even without the external file.

e) In the Properties panel, you can change the objects properties, such **Keep proportions**, and **Position.**

So you have now created your first object in your report! You can view the logo by clicking on the Preview tab.

5.3.2 Add a Text Label

You can use a text object to add a title to the report. Text objects let you place text in the workspace. As well as fixed text, you can also insert the contents of fields (variables) from the database (e.g. company name), or you can use functions (page number, date etc.).

a) In the "Objects" toolbar, choose the "Text" object type.

b) In the workspace, hold down the left mouse button and pull the object to the required size.

c) The formula wizard will now appear which you can use to define the contents of the text object.

d) This dialog consists of a series of tabs each containing different elements to be edited. The following chapters explain the meanings of these elements in more detail.

- Variables and Functions: the available variables, fields and functions.
- Condition: for defining IF-THEN-ELSE conditions.
- Text: for entering fixed text and tabs.
- Date Format: different date formats.
- Number Format: different number formats.
- Operators: available conjunction operators.

e) You can also enter the expression that you want directly in the edit box or modify the text that is there (e.g. put something in brackets).
Therefore, enter our title "List of products" directly. Fixed text must be enclosed in quotation marks. Enter names of variables and functions without brackets.

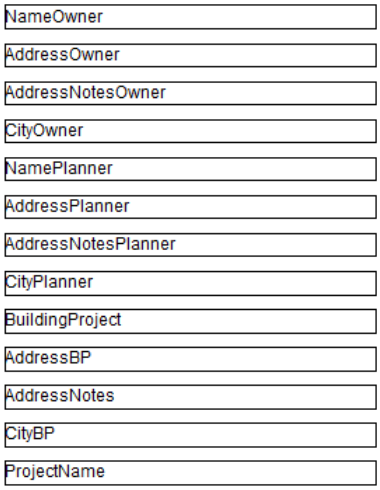
5.4 REPORT DATA SOURCES

Reports are based on data coming from the following sources:

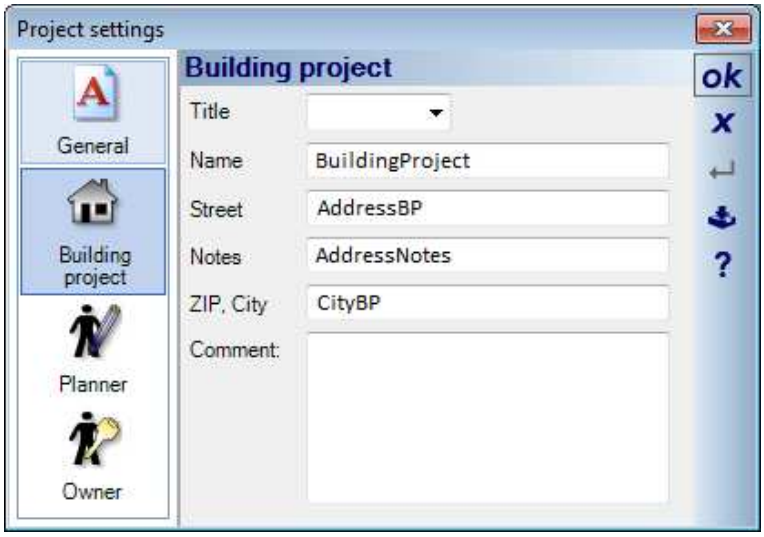
a) Project name and address properties
b) Calculated values
c) The solar panel object
d) The solar data file

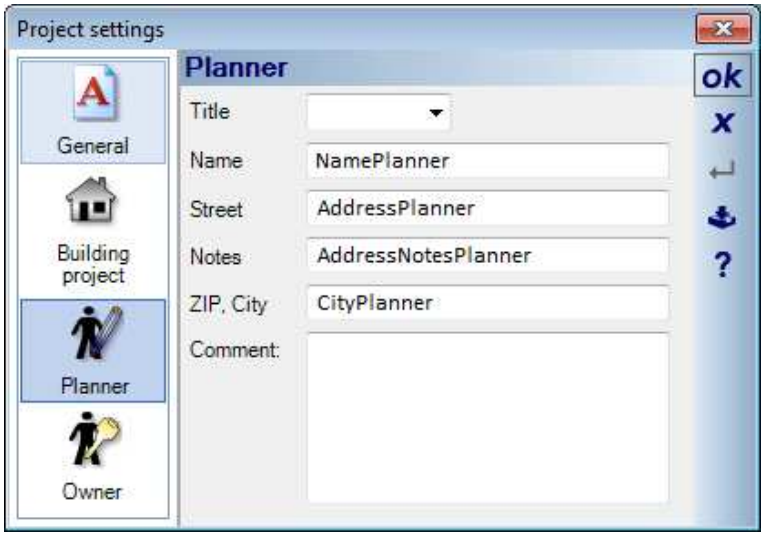
5.4.1 Project name and address properties

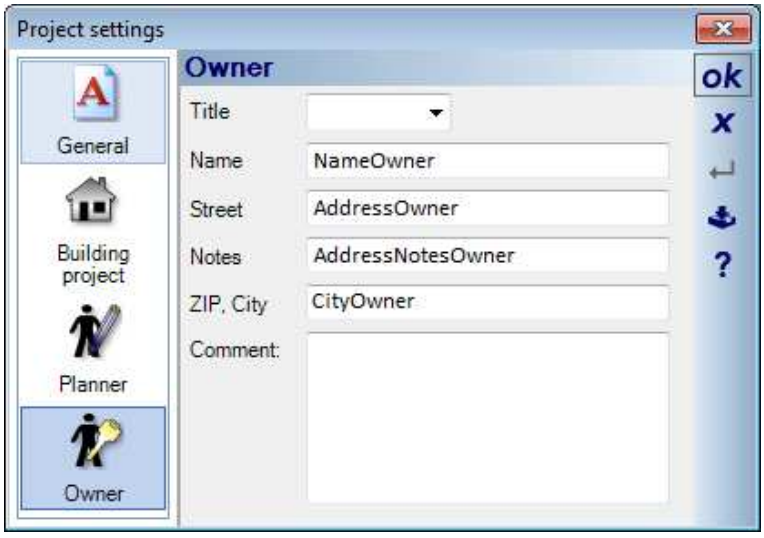
The following variables are generated from the name and address details entered in the Project settings dialog.



Project settings
General
Building project
Planner
Owner
General
Name
ProjectName
Last changes
Date
User
ok
x
?

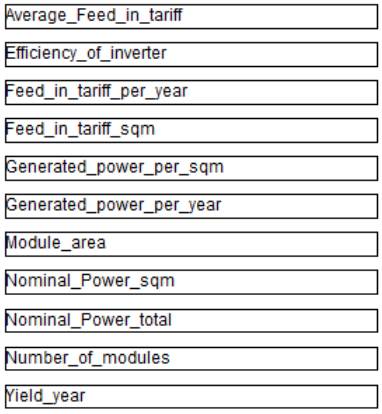

Project settings
General
Building project
Planner
Owner
Building project
Title
Name
BuildingProject
Street
AddressBP
Notes
AddressNotes
ZIP, City
CityBP
Comment:
ok
x
?


Project settings
General
Building project
Planner
Owner
Planner
Title
Name
NamePlanner
Street
AddressPlanner
Notes
AddressNotesPlanner
ZIP, City
CityPlanner
Comment:
ok
x
?



5.4.2 Calculated values

These values are calculated and displayed in the PV unit Analysis function:



Note that some of these values are calculated from values derived from the actual object:

- Panel Nominal Power
- Panel dimensions

5.4.3 The solar data file

The data file is a CSV list of additional properties for each solar panel. The list is called Solar.csv and is located in:

C:\Program Files\Visual Building Solar Designer\Templates\English

And appears in the following format:

```
Datei;Bezeichnung;Artikelnummer;Beschreibung;#.#Preis
140x113.cyg;Mein Modul;Test Panel;Meine Beschreibung;123.45
YL185P23b.cyg;YL 185 P23b;YL185;Solar Panel;500.00
131x90.cyg;;;;500.00
```

The first line contains the data variable names that are imported into the report generator. Each variable is separated by a semi-colon.